



Revised National Plumbing Code of the Philippines

History of Plumbing Practice

The birth of the plumbing profession in the Philippines is traced back to the 17th century. The WALLED CITY known as Intramuros was established by the Spaniards as a model community. The Friar Engineers who built the government buildings, residential and other structures, incorporated European standards in their plumbing installations.

During the 18th and 19th centuries, the Filipino plumbers were assigned the task of maintaining, repairing and/or remodeling plumbing systems in all "pueblos" or towns including churches, convents and government buildings.

The recognized plumbers then were called upon by the "ilustrados" or the elite group to act as consultants of plumber journeymen on matters pertaining to plumbing installations in villas and mansions.

PLUMBING took a great leap at the turn of the 20th century with the arrival of the American soldiers, engineers, Thomasite teachers, doctors and evangelists. Health and hygiene became priority when epidemics including cholera, leprosy, schistosomiasis and other contagious diseases engulfed the Philippines. Alarmed, Governor General Harrison issued a letter of instruction on proper waste disposal in all municipalities.

Sometime in 1902, the PLUMBING TRADE was duly recognized by the government. The City of Manila was the model community. Master Plumber John F. Hass became the first Chief of the Division of Plumbing Construction and Inspection.

Through the initiative of the Filipino Master Plumbers, a plumbing code based on the Plumbing Code of the United States was incorporated into the Building Code for the City of Manila.

In 1935, Francisco Geronimo, Mariano de Ocampo, Igmidio Suarez, Eusebio Mina, Jose Rivera, Raymundo Reyes, Sr., Roberto Feliciano, Gregorio Lazaro, Raymundo Gumapac, John Jones, Trinitario Ortiz, Valentin Casupanan, Catalino Casupanan, Crispin Francisco, Teodoro Pastor, Cornelio Odvina and Jesus Tanghal Dera organized the National Master Plumbers Association of the Philippines (NAMPAP) and had it registered with the Securities and Exchange Commission.

Initiated by NAMPAP, the Department of Public Services of the City of Manila was created by an Act of Congress. City Ordinance 2411, otherwise known as "the Plumbing Code for the City of Manila" was enacted in consultation with NAMPAP. The practice of plumbing was eventually placed under the Department of Public Services, Manila.

The National Government, through the Bureau of Public Works, and other cities and municipalities adopted the Plumbing Code of Manila. NAMPAP spearheaded the enactment of a law regulating the practice of master plumbing in the Philippines.

In 1954, the Third Congress of the Republic of the Philippines in its Second Session, approved after the third reading House Bill No. 962. This became Republic Act No. 1378. On June 18, 1955, R.A. 1378, otherwise known as the "PLUMBING LAW OF THE PHILIPPINES" was signed by President Ramon Magsaysay.

On January 28, 1959, the National Plumbing Code of the Philippines prepared by the NAMPAP was promulgated and approved by Malacañang. NAMPAP also assisted in the passage of the law creating the National Waterworks and Sewerage Authority (NAWASA).

In 1966-1969, the Board of Examiners for Master Plumbers and the NAMPAP prepared a Curriculum for Plumbing Engineering that was approved by the Department of Education and was first introduced at the Feati University.

On November 28, 1967, the First Amendment to the National Plumbing Code was approved, which effected the inclusion of "Asbestos-Cement Pipe" as an approved plumbing material.

Before Martial Law in 1972, Republic Act No. 6541 otherwise known as the "Building Code of the Philippines" was passed with the "National Plumbing Code of 1959" as referral code in full text.

In 1996, NAMPAP President JAIME M. CABASE spearheaded the updating of the Revised National Plumbing Code. Finally, in October 1999, NAMPAP submitted the Draft Code to the Board of Master Plumbers (BOMP) Chaired by Engr. FORTUNATO H. AMOSCO. After careful review, the Professional Regulation Commission under Chairman HERMOGENES POBRE adopted the Revised Plumbing Code of 1999 which His Excellency, President JOSEPH EJERCITO ESTRADA approved last December 21, 1999 pursuant to Section 4 of R.A. 1378 known as the Plumbing Law.

In order to continuously upgrade the technical expertise of Master Plumbers and propagate the growth of the plumbing industry; NAMPAP have caused the holding of regular National Convention as well as Regional Conferences such as LUZON, VISAYAS and MINDANAO, as well as the Midyear Forum where manufacturers, dealers and suppliers of plumbing tools, equipment, materials and services are given the opportunity to conduct product presentations for the benefit of the plumbing practitioners.

Preface

An adequate Plumbing Code is one of the most important governances in modern and healthful human existence. It involve the three basic necessities of life, such as: AIR, WATER and FOOD.

The plumbing systems: water supply, sewage collection and disposal and stormwater drainage involve the right choice of materials, the economical design of the systems and their proper operation and maintenance. The supply of adequate hot, cold and chilled water, the efficient conveyance and disposal of wastewater such as food wastes and human excreta from plumbing fixtures require provision of enough air, which will result to the efficient installation of the systems.

Plumbing practice has grown in scope and magnitude with the progress in complexities of constructions such as high rise buildings with multi - level basement floors that now require electro - mechanical equipment and controls. The dwindling water resources intensify water use conservation. Modern or state-of-the-art plumbing installation now require the close coordination of works among Master Plumbers, Architects and Engineers to come up with the most efficient and economical plumbing installations.

I wish to thank wholeheartedly those who have given their time in making available their expertises by discussing with us certain important aspects of this Revised National Plumbing Code of the Philippines. Many of them have unselfishly rendered invaluable assistance in criticizing and improving our text and for innumerable insights into this complex subject. Also, my thanks go to my wife CONCEPCION O. CABASE for her untiring full support in pursuing this major activities of NAMPAP.

JAIME M. CABASE
FNAMPAP
NAMPAP National President

*Caloocan City, Philippines
May 3, 2000*

Basic Principles

The basic principles of the 1999 National Plumbing Code of the Philippines is an update of the tenets established in the "Plumbing Law of the Philippines" approved on 18 June 1955 as amended on 28 November 1959.

The basic goal of the 1999 National Plumbing Code of the Philippines is to ensure the unqualified observance of the latest provisions of the plumbing and environmental laws.

Principle No. 1 - All premises intended for human habitation, occupancy or use shall be provided with a supply of pure and wholesome water, neither connected with unsafe water supplies nor subject to hazards of backflow or back-siphonage.

Principle No. 2 - Plumbing fixtures, devices and appurtenances shall be supplied with water in sufficient volume and at pressure adequate to enable them to function satisfactorily and without undue noise under all normal conditions of use.

Principle No. 3 - Plumbing shall be designed and adjusted to use the minimum quantity of water consistent with proper performance and cleaning.

Principle No. 4 - Devices for heating and storing water shall be so designed and installed as to prevent dangers from explosion through overheating.

Principle No. 5 - Every building having plumbing fixtures installed and intended for human habitation, occupancy or use on premises abutting on a street, alley or easement where there is a public sewer, shall be connected to the sewer system.

Principle No. 6 - Each family dwelling unit on premises abutting on a sewer or with a private sewage-disposal system shall have at least one water closet and one kitchen-type sink. Further, a lavatory and bathtub or shower shall be installed to meet the basic requirements of sanitation and personal hygiene.

Principle No. 7 - Plumbing fixtures shall be made of smooth non-absorbent material, free from concealed fouling surfaces and shall be located in ventilated enclosures.

Principle No. 8 - The drainage system shall be designed, constructed and maintained to safeguard against fouling, deposit of solids, clogging and with adequate cleanouts so arranged that the pipes may be readily cleaned.

Principle No. 9 - All pipings of plumbing systems shall be of durable NAMPAP-APPROVED materials, free from defective workmanship, designed and constructed by Registered Master Plumbers to ensure satisfactory service.

Principle No. 10 - Each fixture directly connected to the drainage system shall be equipped with a water-sealed trap.

Principle No. 11 - The drainage piping system shall be designed to provide adequate circulation of air free from siphonage, aspiration or forcing of trap seals under ordinary use.

Principle No. 12 - Vent terminals shall extend to the outer air and installed to preempt clogging and the return of foul air to the building.

Principle No. 13 - Plumbing systems shall be subjected to such tests to effectively disclose all leaks and defects in the workmanship.

Principle No. 14 - No substance which will clog the pipes, produce explosive mixtures, destroy the pipes or their joints or interfere unduly with the sewage-disposal process shall be allowed to enter the building drainage system.

Principle No. 15 - Proper protection shall be provided to prevent contamination of food, water, sterile goods and similar materials by backflow of sewage. When necessary, the fixture, device or appliance shall be connected indirectly with the building drainage system.

Principle No. 16 - No water closet shall be located in a room or compartment which is not properly lighted and ventilated.

Principle No. 17 - If water closets or other plumbing fixtures are installed in buildings where there is no sewer within a reasonable distance, suitable provision shall be made for disposing of the building sewage by some accepted method of sewage treatment and disposal, such as a septic tank.

Principle No. 18 - Where a plumbing drainage system may be subject to backflow of sewage, suitable provision shall be made to prevent its overflow in the building.

Principle No. 19 - Plumbing systems shall be maintained in serviceable condition by Registered Master Plumbers.

Principle No. 20 - All plumbing fixtures shall be installed properly spaced, to be accessible for their intended use.

Principle No. 21 - Plumbing shall be installed by Registered Master Plumbers with due regard to the preservation of the strength of structural members and the prevention of damage to walls and other surfaces through fixture usage.

Principle No. 22 - Sewage or other waste from a plumbing system which may be deleterious to surface or sub-surface waters shall not be discharged into the ground or into any waterway, unless first rendered innocuous through subjection to some acceptable form of treatment.

Master Plumber's Code of Ethics

A REGISTERED MASTER PLUMBER SHALL MAINTAIN A PROFESSIONAL BEARING CONSISTENT WITH AN HONORABLE AND DIGNIFIED PURSUIT OF HIS/HER PROFESSION, ADHERING TO A SET OF CONDUCT BECOMING OF HIS/HER CALLING, AND SHALL NOT:

1. Act in an unprofessional manner and demand any remuneration other than his/her original charges except for additional services not covered in the basic contract;
2. Supplant another Registered Master Plumber after definite steps have already been taken toward his/her being commissioned to perform the contract;
3. Underbid another Registered Master Plumber by reducing his/her professional fees after being informed of the fees charged by the other Registered Master Plumber;
4. Take the advantage of a salaried government position to compete unfairly with a practicing Registered Master Plumber;
5. Allow the use of his/her License as Registered Master Plumber for a fee to an unlicensed Master Plumber in plumbing works without his/her personal supervision.
6. Injure falsely or maliciously, directly or indirectly, the reputation of another Registered Master Plumber by reviewing his/her work for the same client unless the professional services of the former have been officially terminated and all professional fees have been fully paid by the client;
7. Advertise in self-laudatory language, act in any manner and engage in any practice which tend to bring dishonor to the dignity of the Registered Master Plumber, the National Master Plumbers Association of the Philippines (NAMPAP) and the plumbing profession.

Chapter 1

ADMINISTRATION

*** Section 100 – PERMIT REQUIRED**

To ensure compliance of the provisions of this Code, the professional services of a Registered and Licensed Master Plumber shall be enlisted in accordance with Republic Act No. 1378, the "Plumbing Law".

It shall be unlawful for any person, firm or corporation, whether acting as principal, servant, agent or employee, to do or cause to be done any plumbing or drainage work for which a permit is required without securing prior permit from the Office of the Building Official having jurisdiction under the Department of Public Works and Highways, Department of Interior & Local Government or City Mayors.

**** Section 101 – TO WHOM PERMITS MAY BE ISSUED**

No permit shall be issued to any person, firm or corporation, to do or cause to be done any installation of plumbing work regulated by this Code, except to a Registered and Licensed Master Plumber, holding a valid, unexpired and unrevoked certificate of registration as required by Republic Act No. 1378, as amended.

***** Section 102 – APPLICATION FOR PERMIT**

102.1 Application – A Registered and Licensed Master Plumber shall file an application at the Office of the Building Official in behalf of the building Owner for whom such work shall be done and shall fill out the forms provided for that purpose. Every application shall:

- 102.1.1** Identify and describe the plumbing work to be covered by the permit for which an application is made;
- 102.1.2** Describe the land upon which the proposed plumbing work is to be done, legal description, street address or similar description that will readily identify and locate the proposed building or work;

* Sec. 148 NPC 1959

** Sec. 149 NPC 1959

*** Sec. 150 NPC 1959

- 102.1.3 Indicate the use or occupancy for which the proposed plumbing work is intended;
 - 102.1.4 Be accompanied by plans, drawings, diagrams, computations, technical specifications, and other data as required in Subsection 102.2;
 - 102.1.5 Give such other data and information as required by the Administrative Authority;
 - 102.1.6 Be signed by Owner or permittee, who is required to submit evidence to indicate such authority; and
 - 102.1.7 Be signed and sealed by the Registered and Licensed Master Plumber.
- 102.2 **Plans and Specifications** – All plumbing plans, drawings, diagrams, design analyses/computations as required, technical specifications, bills of materials and other required documents for all types of occupancy shall be prepared, signed and sealed by a Registered and Licensed Master Plumber, without limitations, pursuant to Republic Act 1378, as amended, and shall be submitted in six (6) sets of the aforementioned requirements with each application for a permit.
- 102.3 **Information on Plans and Specifications** – shall be drawn to scale on tracing paper or cloth and shall be of sufficient clarity to indicate the location, nature and extent of the work proposed showing in detail, conformance with the provisions of this Code, relevant laws, ordinances, rules and regulations.

The technical specifications submitted shall comply with the provisions of existing standards of the National Building Code and this Code.

Section 103 – PERMIT ISSUANCE

- 103.1.1 The application, plans, technical specifications and other required documents filed by an applicant for a permit shall be reviewed by the Administrative Authority. Other concerned departments which verify compliance with other applicable laws may review such plans. If the Administrative Authority finds that the work described in an application for permit and the plans, specifications and other documents filed therewith conform to the requirements of the Plumbing Code and other pertinent laws and ordinances, and upon payment of the fees specified in Section 105, a permit shall then be issued to the Applicant.

- 103.1.2 When the Administrative Authority issues the permit he shall endorse in writing or stamp the plans and specifications as "APPROVED". Such approved plans and specifications shall not be changed, modified or altered without authorization from the Administrative Authority and all works shall be done in accordance with approved plans and specifications.
 - 103.1.3 The Administrative Authority may issue a Partial Permit for the construction of a part of a large and/or complicated plumbing system before the entire plans and specifications for the whole system have been submitted or approved, provided adequate information and detailed statements have been filed, complying with all pertinent requirements of this Code. The holder of such partial permit may proceed at his own risk without assurance that the final permit for the entire building, structure or plumbing system will be granted.
- 103.2 **Retention of Plans** – One set of approved plans, specifications, computations and related data shall be retained by the Administrative Authority. Two (2) sets of approved plans, specifications and data shall be returned to the applicant and Owner, one (1) set of which shall be kept at the jobsite at all times while the work is in progress.
- 103.3 **Validity of Permit** – The issuance of a permit or approval of plans and specifications shall not be construed as a permit to violate any provision of this Plumbing Code or of any other applicable ordinances. The issuance of a permit based on submitted plans, specifications or other documents shall not prevent the Administrative Authority from thereafter requiring the correction of errors on said plans, specifications and other documents and from stopping an on-going plumbing installations violative of this Code or of other pertinent ordinances of this Jurisdiction.
- 103.4 **Expiration** - A plumbing permit issued under the provisions of this Code shall expire and become null and void if the plumbing work authorized therein is not commenced within one year from the date of such permit or if the plumbing work so authorized is suspended or abandoned at any time after having been commenced for a period of 120 days.
- In case of renewal of a plumbing permit, a fee equivalent to one-half the amount of the original fee shall be paid.

***103.5 Suspension or Revocation** – The Administrative Authority may, in writing, suspend or revoke a permit issued under the provisions of this Code whenever issued in error or on the basis of incorrect information supplied or in violation of pertinent ordinances, rules and regulations.

Section 104 – APPLICATION FOR EXISTING PLUMBING SYSTEM

- 104.1 Additions, Alterations or Repairs** – may be made to any existing plumbing system provided the addition, alteration or repair works conform to requirements for a new plumbing system. Additions, alterations or repairs shall not render an existing system unsafe, unsanitary or overloaded.
- 104.2 Changes in Building Occupancy** – Plumbing systems which are a part of any building or structure undergoing a change in use or occupancy, as defined in the National Building Code, shall comply with all requirements of this Code applicable to the changed use or occupancy.
- 104.3 Maintenance** – All plumbing systems, materials and appurtenances, both existing and new, and all parts thereof shall be maintained in proper operating condition. All devices or safeguards required by this Code shall be maintained in conformance with the existing Code edition at the time the plumbing system was installed. The owner or his designated agent shall be responsible for the maintenance of plumbing systems. To determine compliance with this subsection, the Administrative Authority may cause the re-inspection of any plumbing system.
- 104.4 Moved Buildings** – Plumbing systems, which are part of buildings or structures in one place and moved into another Jurisdiction, shall comply with the provisions of this Code for new installation.

* Sec. 153 NPC 1959

Section 105 – INSPECTIONS

105.1 General – All plumbing systems for which permits are required by this Code shall be inspected by the Administrative Authority. No portion of any plumbing system shall be concealed until inspected and approved. The Administrative Authority or his representative shall not be liable for expenses incurred in the removal and replacement of materials required to warrant proper inspection. When the installation of a plumbing system is complete, an additional and final inspection shall be made. Plumbing systems regulated by this Code shall not be connected to the water and energy fuel supplies nor to the sewer system until authorized by the Administrative Authority and other Agencies concerned.

All Administrative Plumbing Personnel, Plumbing Inspector shall be a Registered and Licensed Master Plumber in accordance with the provision of Republic Act 1378, otherwise, known as "*Plumbing Law*".

105.2 Operation of Plumbing Equipment – The requirements of this Section do not prohibit the operation or use of any plumbing accessory installed to replace existing equipment or fixtures serving an occupied portion of the building when a request for inspection of such equipment or fixtures has been filed with the Administrative Authority not more than 72 hours after such replacement work is completed and before any portion of such plumbing system is concealed by any permanent portion of the building.

105.3 Testing of Systems – All plumbing systems shall be tested and approved as required by this Code or the Administrative Authority.

105.4 Inspection Requests – It shall be the duty of the person doing the plumbing work authorized by a permit to notify the Administrative Authority that such work is ready for inspection. The Administrative Authority requires that every request for inspection be filed at least three (3) working days before such inspection is intended. Such request shall be in writing and jointly signed by the Owner and the Registered and Licensed Master Plumber – Contractor.

It shall be the duty of the person requesting inspections required by this Code to provide access to and means for proper inspection of such work as well as provide all the equipment, the tools, power and water required for the test.

105.5 Other Inspections – In addition to the inspections required by this Code, the Administrative Authority may require other inspections of the plumbing work to comply with the other provisions of this Code, other pertinent laws and ordinances enforced by the Administrative Authority.

105.6 Reinspections

- 105.6.1 A fee will be charged on the Applicant for each inspection or re-inspection when a portion of the plumbing work for inspection is called for is not completed.
- 105.6.2 This provision shall not be interpreted as requiring re-inspection fees for the first time a job is rejected for failure to comply with the requirements of this Code, but as deterrent on the practice of calling for inspections before the job is ready for inspection or re-inspection.
- 105.6.3 Re-inspection fees shall be charged when the approved plans are not readily available to the Inspector, for failure to provide access and facility on the date when the inspection is requested, or for deviating from plans requiring the approval of the Administrative Authority.
- 105.6.4 To obtain re-inspection, the Applicant shall file an application, in writing, on a form furnished for that purpose and pay the re-inspection fee.
- 105.6.5 In instances where re-inspection fees have been assessed, but pending payment of required fees, no re-inspection of the work will be performed.

Section 106 – CONNECTION APPROVAL

- 106.1 **Permanent Connections** – no person shall install connections to any water supply line, sewer or storm drain systems as required by this Code and for which other applications and permits are also required from other Agencies before approval by the Administrative Authority.
- 106.2 **Temporary Connections** – Administrative Authority will endorse to other authorities or government agencies the issuance of temporary connections of the plumbing equipment to the water supply main, sewer main, power line and gas main for the purpose of testing the equipment.

Section 107 – SPECIAL PROVISIONS

- 107.1 All Licensed Master Plumbers registered in accordance with the provisions of Republic Act No. 1378 shall secure for themselves a seal of the standard size and type as required. The same shall be used on all plumbing applications for permits and all plumbing plans prepared by Registered and Licensed Master Plumbers as well as on all documents required in the practice of their profession. The seal shall be round in shape and shall be inscribed with the following:
- 107.1.1 Registered and Licensed Master Plumber at upper portion of the round seal.
- 107.1.2 Name of Registered and Licensed Master Plumber at the upper center.
- 107.1.3 The registration number shall appear at the center below the name.
- 107.1.4 Philippines, appearing at the lower portion of the round seal.

Section 108 – PLUMBING FIXTURES REQUIRED

Each building shall be provided with sanitary facilities in accordance with best practice for mobility of disabled persons as provided in the National Building Code of the Philippines or by other government departments having jurisdiction.

Chapter 2

DEFINITIONS

Section 201 – GENERAL

For the purpose of this Code, the following terms shall bear the meanings indicated in this Chapter.

No attempt is made to define ordinary words, used in accordance with their established dictionary meanings except where a word has been used loosely, that it becomes necessary to define its meaning as adopted in this Code to avoid misunderstanding.

Since the primary purpose is to define terms in general rather than nouns, the definitions are arranged alphabetically according to the first word of the term rather than the noun.

Section 202

"A"

- 202.1 **ABS** – Acrylonitrile-Butadiene-Styrene
- *202.2 **ALLEY** – any public space, public park or thoroughfare less than three (3) meters but not less than two (2) meters in width dedicated or deeded for public use.
- **202.3 **ALTER or ALTERATION** - any change, addition or modification in construction or occupancy.
- 202.4 **ACCESSIBLE** – when applied to a fixture, connection, appliance or equipment, shall mean having access thereto, but which may require prior removal of an access panel, door or similar obstruction. “Readily accessible” shall mean direct access without the necessity of removing any panel, door or similar obstruction.
- 202.5 **AIRBREAK** – a physical separation, which may be a low inlet into the indirect waste receptor from the fixture, appliance or device indirectly connected.

* Sec. 1 NPC 1959

- 202.6 **AIR GAP, DRAINAGE** - the unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe, plumbing fixture, appliance or appurtenance conveying waste to the flood level rim of the receptor.
- 202.7 **AIR GAP, WATER DISTRIBUTION** - an unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet conveying potable water to the flood-level rim of any tank, vat or fixture.
- *202.8 **APPROVED** – accepted or acceptable under an applicable specifications or standard stated or cited in this Code, or accepted as suitable for any proposed use under procedures and powers of the Administrative Authority.
- 202.9 **APPROVED TESTING AGENCY** - an organization primarily established for purposes of testing to approve standards and approved by the Administrative Authority.
- *202.10 **AUTHORITY, ADMINISTRATIVE** – The Administrative Authority including the Building Official, the Commission, the Board and such other department or agency established and authorized to administer and enforce the provisions of Republic Act 1378 – The Plumbing Code of the Philippines, Presidential Decree No. 223; as amended by P.D. 657 – creating the Professional Regulation Commission and prescribing its powers and functions, and Letter of Instruction No. 1000 – ordering and directing the Professional Regulation Commission (PRC), the former Ministry of Human Settlements, the Departments of Foreign Affairs, Education and Culture, Public Works and Highways, Tourism, Transportation and Communication all 500T agencies concerned, to authorize and support PRC Accredited Bonafide Professional Organizations only, and their members to organize, host, sponsor or represent the Filipino Professionals in national, regional and international fora, conventions where the concerned professions are involved; and further orders and directs that all government agencies and instrumentalities shall give priority to bonafide members of the accredited professional organizations in the hiring of its employees and engagement of professional services.

* Sec. 3 NPC 1959

** Sec. 4 NPC 1959

Section 203
"B"

- * 203.1 **BACKFLOW** – the flow of water or other liquids, mixtures or substances into the distributing pipes of a potable supply of water from any source other than from its intended source.
 - 203.2 **BACKFLOW CONNECTION** - condition or any arrangement whereby reverse flow can occur.
 - ** 203.3 **BACKPRESSURE BACKFLOW** – occurs due to an increased reverse pressure above the supply pressure. This may be due to pumps, boilers, gravity or other sources of pressure.
 - 203.4 **BACKFLOW PREVENTER** – device or means to prevent flow of liquid from returning to the source of supply. Also called vacuum breaker.
 - *** 203.5 **BACK-SIPHONAGE** - the flowing back of used, contaminated or polluted water from a plumbing fixture or vessel into a water supply pipe due to a negative pressure in such pipe. See backflow.
 - 203.6 **BACKWATER VALVE** – a device installed in a drainage system to prevent reverse flow.
 - **** 203.7 **BACKVENT PIPE** - the part of a vent line, which connects directly with an individual trap underneath or behind the fixture and extends to the branch or main vent pipe at any point higher than the fixture or fixture traps it serves. This is sometimes called an individual vent. See Revent pipe.
 - ***** 203.8 **BALL COCK** – a valve opened and closed by the fall and rise, respectively, of an attached ball floating on the surface of the liquid.
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 - *** 203.9 **BALL JOINT** – a type of pipe connection in which a ball-shaped end is held in a cuplike shell and allows movements in every direction.
 - 203.10 **BATHROOM** – a room equipped with a shower stall or bathtub.
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 - *** 203.11 **BATTERY OF FIXTURES** – any of two or more similar adjacent fixtures which discharge into a common horizontal soil or waste branch.
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 - **** 203.12 **BELL OR HUB** – that portion of a pipe which, for a short distance, is sufficiently enlarged to receive the end of another pipe of the same diameter for the purpose of making a caulked or push-on joint
- * Sec. 5 NPC 1959
 ** Sec. 6 NPC 1959
 *** Sec. 7 NPC 1959
 **** Sec. 8 NPC 1959
 ***** Sec. 9 NPC 1959
 ***** Sec. 10 NPC 1959
 ***** Sec. 11 NPC 1959
 ***** Sec. 12 NPC 1959

- * 203.13 **BENDING PIN (or IRON)** – a tool for straightening or bending lead pipe.
 - ** 203.14 **BIBB** – synonymous with faucet, cock, tap, plug, etc. The word “faucet” is preferred.
 - *** 203.15 **BIDET** - A plumbing fixtures used for washing the middle private part of the body, especially the genitals. Also called a “sitz” bath.
 - **** 203.16 **BLANK FLANGE** – A pipe flange that is not drilled for bolt holes.
 - ***** 203.17 **BLIND FLANGE** – a flange that closes the end of a pipe. There is no opening for the passage of liquid or gas.
 - ***** 203.18 **BLOW-OFF** – a controlled outlet of a pipeline to discharge liquid or detritus.
 - 203.19 **BOARD** - the Licensure Board for Master Plumbers
 - 203.20 **BOILER BLOW-OFF** - a valved outlet of a boiler that permits discharge of accumulated sediment.
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 - *** 203.21 **BRANCH** -- any part of the piping system other than a main, riser or stack.
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 - **** 203.22 **BRANCH INTERVAL** – a length of soil or waste stack corresponding in general to a story height, but in no case less than 2.43 meters within which the horizontal branches from one floor or story of a building are connected to the stack.
 - 203.23 **BRANCH, FIXTURE** – see Fixture Branch
 - 203.24 **BRANCH, HORIZONTAL** – see Horizontal Branch
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 - **** 203.25 **BRANCH VENT** - a horizontal vent connecting one or more individual vertical back vents with the vent stack or stack vent.
 - 203.26 **BRAZED JOINT** – any joint obtained by joining of metal parts with alloys which melt at temperatures higher than 449 degrees centigrade, but lower than the melting temperature of the parts to be joined.
- * Sec. 13 NPC 1959
** Sec. 14 NPC 1959
*** Sec. 15 NPC 1959
**** Sec. 16 NPC 1959
***** Sec. 17 NPC 1959
***** Sec. 18 NPC 1959
***** Sec. 19 NPC 1959
***** Sec. 20 NPC 1959
***** Sec. 21 NPC 1959

- 203.27 **B & S** – Brown and Sharpe (Specification) or Bell and Spigot (Ends of Pipes)
- * 203.28 **BUILDING** – a structure built, erected and framed of component structural parts designed for the housing, shelter, enclosure or support of persons, animals or property of any kind.
- ** 203.29 **BUILDING DRAIN** – that part of the lowest horizontal piping of a drainage system which receives the discharge from soil, waste and other drainage pipes inside the walls of the building and conveys it to the building sewer beginning 0.6 meter outside the building wall.
- *** 203.30 **BUILDING SEWER** – that part of the horizontal piping of a drainage system which starts from the end of the building drain and which receives the discharge of the building drain and conveys it to a public sewer, private sewer, individual sewage disposal system or other point of disposal.
- **** 203.31 **BUILDING SUBDRAIN** – that portion of an underground system, which cannot drain by gravity into the building sewer.
- 203.32 **BUILDING SUPPLY** – the pipe carrying potable water from the water meter or other source of water supply to a building or other point of use or distribution on the lot. Building supply shall also mean water service connection.

Section 204 "C"

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- ** 204.1 **CAULKING** – plugging an opening with oakum, lead or other materials that are pounded into the annular space. Also, the material pounded into the annular opening.
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- *** 204.2 **CAP** – a fitting, screwed or caulked over the end of a pipe for closing the pipe end.
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- *** 204.3 **CATCH BASIN** – a receptacle in which liquids are retained for a sufficient period of time to allow settleable material to deposit.
- 204.4 **CERTIFIED BACKFLOW ASSEMBLY TESTER** – a person who has shown competence to test and maintain backflow assemblies to the satisfaction of the Administrative Authority having jurisdiction.

* Sec. 22 NPC 1959

** Sec. 23 NPC 1959

*** Sec. 24 NPC 1959

**** Sec. 25 NPC 1959

***** Sec. 26 NPC 1959

***** Sec. 27 NPC 1959

***** Sec. 28 NPC 1959

- * 204.5 **CESSPOOL** – a non-watertight lined excavation in the ground which receives the discharge of a sanitary drainage system or part thereof, designed to retain the organic matter and solids discharging therefrom, but permitting the liquid to seep through the bottom and sides of the cesspool.
- 204.6 **CHASE** – a vertical shaft for installation of different pipe stacks.
- ** 204.7 **CHECK VALVE** – a valve that automatically closes to prevent the flow of liquid or gas in a reverse direction
- *** 204.8 **CIRCUIT VENT** – a group vent pipe which starts in front of the extreme fixture connection on a horizontal branch and connects to the vent stack. See loop vent, also.
- 204.9 **CLARIFIER** – See Interceptor.
- 204.10 **CODE** – The word “Code” or “this Code,” when used alone, shall mean these regulations, subsequent amendments thereto or any emergency rule or regulation which the Administrative Authority having jurisdiction may lawfully adopt.
- **
** 204.11 **COMMON VENT** - see unit vent and dual vent.
- 204.12 **COMBINATION WASTE AND VENT SYSTEM** – a specially designed system of waste piping embodying the horizontal wet venting of one or more sinks or floor drains by means of a common horizontal waste and vent pipe, adequately sized to provide free movement of air above the flow line of the drain.
- 204.13 **COMBUSTIBLE CONSTRUCTION** - a structure which any part of its structural framework will ignite and burn at a temperature of 756 degrees centigrade or less.
- 204.14 **COMMISSION** – The Professional Regulation Commission (PRC).
- 204.15 **COMMON** – that part of a plumbing system designed and installed to serve more than one (1) appliance, fixture, building or system.
- 204.16 **CONFINED SPACE** – a room or space having a volume less than 14 cu. m with 250 kilogram calorie of the aggregate input rating of all fuel-burning appliances installed in that space.

* Sec. 29 NPC 1959

** Sec. 30 NPC 1959

*** Sec. 31 NPC 1959

**** Sec. 32 NPC 1959

- 204.17 **CONTAMINATION** – an impairment of the quality of the potable water which creates an actual hazard to the public health through poisoning or spread of disease by sewage, industrial fluids or waste. Also, defined as High Hazard.
- ** 204.18 **CONTINUOUS VENT** - a continuous vent is vertical vent that is a continuation of the drain to which the vent connects.
- 204.19 **CONTINUOUS WASTE** – a drain connecting the compartments of a set of fixtures to a trap or connecting other permitted fixtures to a common trap.
- * 204.20 **CONDUCTOR OR DOWNSPOUT** – a vertical pipe to convey rainwater.
- *** 204.21 **CORPORATION COCK** – a stop valve placed at the connection of the water service pipe to the water main.
- **
- ** 204.22 **COURT** – an open, unoccupied space, bounded on two (2) or more sides by the walls of the building. An inner court is a court entirely within the exterior walls of a building. All other courts are outer courts.
- 204.23 **CRITICAL LEVEL** – C-L or C/L marking on a backflow prevention device or vacuum breaker is a point conforming to approved standards and established by the testing laboratory (usually stamped on the device by the manufacturer) which determines the minimum elevation above the flood level rim of the fixture or receptacle served where the device may be installed. When a backflow prevention device does not bear a critical level marking, the bottom of the vacuum breaker, combination valve or the bottom of any such approved device shall constitute the critical level.
- ***
- ** 204.24 **CROSS-CONNECTION** – any connection or arrangement, physical or otherwise, between a potable water supply system and any plumbing fixture or any tank, receptacle, equipment or device, through which enables non-potable, used, unclean, polluted, contaminated water or other substances to enter into any part of such potable water system under any condition.

* Sec. 33 NPC 1959

** Sec. 34 NPC 1959

*** Sec. 35 NPC 1959

**** Sec. 36 NPC 1959

***** Sec. 37 NPC 1959

Section 205**"D"**

- * 205.1 **DEAD-END** – the extended portion of a pipe that is closed at one end to which no connections are made on the extended portion, thus permitting the stagnation of liquid or air therein.
- 205.2 **DEPARTMENT HAVING JURISDICTION** – the Administrative Authority and includes any other law enforcement agency concerned by any provision of this Code, whether such agency is specifically named or not.
- ** 205.3 **DEVELOPED LENGTH** – the length of a pipe along its centerline and fittings.
- *** 205.4 **DIAMETER** – unless specifically stated, the term "diameter" is the nominal diameter as designated commercially. I.D. denotes inside diameter of pipe and O.D. denotes outside diameter of tube.
- **** 205.5 **DOMESTIC SEWAGE** - the liquid and water-borne wastes derived from the ordinary living processes, free from industrial wastes and of such character that permit satisfactory disposal without special treatment. It is discharged into the public sewer or into a private sewage disposal system.
- ***
** 205.6 **DOUBLE-BEND FITTING** – a pipe fitting with adjacent reverse bends and shaped like the letter "S"
- ***
*** 205.7 **DOUBLE OFFSET** – two offsets in succession or in series such that the centerlines of the outside ends are in the same straight line.
- ***
*** 205.8 **DOWNSPOUT** – the vertical portion of a rainwater conductor.
- ***
**** 205.9 **DRAIN** – a pipe, which carries ground and surface waters, storm water or wastewater into a building drainage system.
- ****
**** 205.10 **DRAINAGE SYSTEM** – includes all the pipings within public or private premises which convey sewage or other liquid wastes to a legal point of disposal but does not include the mains of a public sewer system or a public sewage treatment or disposal plant.
- *****
***** 205.11 **DRY VENT** – a vent that does not carry liquid or water-borne wastes.
- *****
***** 205.12 **DUAL VENT** see Unit Vent.

* Sec. 38 NPC 1959

***** Sec. 42 NPC 1959

***** Sec. 46 NPC 1959

** Sec. 39 NPC 1959

***** Sec. 43 NPC 1959

***** Sec. 47 NPC 1959

*** Sec. 40 NPC 1959

***** Sec. 44 NPC 1959

***** Sec. 48 NPC 1959

**** Sec. 41 NPC 1959

***** Sec. 45 NPC 1959

- 205.13 **DURHAM SYSTEM** – a term used to describe soil or waste system where all pipings are of threaded pipe, tubing or other such rigid construction using recessed drainage fittings to correspond to the types of piping.

Section 206 “E”

- 206.1 **EFFECTIVE OPENING** – is the minimum cross-sectional area at the point of water supply discharge measured or expressed in terms of: (1) diameter of a circle; (2) if the opening is not circular, the diameter of a circle of equivalent cross-sectional area. (This is applicable also to air gap installation.)
- * 206.2 **EXISTING WORK** – the on-going installation of the plumbing system or any part thereof which has been installed prior to the effectivity of this Code.

Section 207 “F”

- ** 207.1 **FAMILY** – one person living alone or a group living together, whether related to each other by birth or not.
- *** 207.2 **FAUCET** – a valve located at the end of a water pipe through of which water can be drawn from or held within the pipe.
- **
- ** 207.3 **FERRULE** – a metallic sleeve, caulked or joined to an opening in a pipe, into which a plug is screwed that can be removed for cleaning or examining the interior of the pipe.
- ***
- ** 207.4 **FIXTURE** – a receptacle other than a trap attached to a plumbing system in which water or wastes may be collected or retained for ultimate discharge into the plumbing system.
- ***
- *** 207.5 **FIXTURE BRANCH** – the water supply pipe between the fixture supply pipe and the water-distributing pipe.
- ****
- *** 207.6 **FIXTURE DRAIN** – the drainpipe from the trap of a fixture to the junction of that drain with any other drainpipe.

* Sec. 49 NPC 1959

** Sec. 50 NPC 1959

*** Sec. 51 NPC 1959

**** Sec. 52 NPC 1959

***** Sec. 53 NPC 1959

***** Sec. 54 NPC 1959

***** Sec. 55 NPC 1959

- 207.7 **FIXTURE SUPPLY** – a water supply pipe connecting the fixture with the fixture branch.
- * 207.8 **FIXTURE UNIT** – is an arbitrary quantity in terms of which the load-producing effects or water requirements on the plumbing system of different kinds of plumbing fixtures are expressed in some arbitrarily chosen scale. One fixture unit is equivalent to a rate of flow at 28.3 liters per minute (1 cu. ft./minute).
- ** 207.9 **FLOOD LEVEL** – the level in a fixture at which water begins to overflow over the top or rim of the fixture.
- 207.10 **FLOOD LEVEL RIM** – is the top edge of a receptacle from where water overflows.
- 207.11 **FLOODED** – a fixture is flooded when the liquid therein rises to the flood level rim.
- *** 207.12 **FLOOR AREA** – the area included within surrounding walls of a building (or portion thereof), exclusive of vent shafts and courts.
- 207.13 **FLUSH TANK** – a tank located above or integral with water closet, urinal or similar fixtures for flushing or removing excrements in the fixture.
-
- 207.14 **FLUSH VALVE** - is a device located at the bottom of the tank for the purpose of flushing waster closet and similar fixtures.
- 207.15 **FLUSHOMETER TANK** – is integrated within an air accumulator vessel which is designed to discharge a predetermined quantity of water into fixtures for flushing purposes.
- 207.16 **FLUSHOMETER VALVE** – is a device, which discharges a predetermined quantity of water into fixtures for flushing purposes and is actuated by direct water pressure.

**Section 208
“G”**

- — 208.1 **GATE VALVE** – a valve in which the flow of water is cut off by means of a circular disc fitted against machine-smoothed faces, at right angles to the direction of flow. The disk is raised or lowered by means of a threaded stem connected to the handle of the valve. The opening in the valve is usually as large as the full bore of the pipe.

* Sec. 56 NPC 1959

** Sec. 58 NPC 1959

*** Sec. 59 NPC 1959

**** Sec. 60 NPC 1959

***** Sec. 61 NPC 1959

- * 208.2 **GLOBE VALVE** – a valve in which the flow of fluid is cut off by means of a circular disc that fits over and against the horizontal valve seat. The movement of the plane of disc is parallel to the normal direction of flow of water through the orifice resulting to a tortuous passage which offers a high-pressure loss.
- ** 208.3 **GOOSENECK** - a return bend of small-sized pipe, one end of which is about 30 cm. long and the other end is about 7.5 cm. long. It is commonly used as a faucet for a pantry sink. Also, the term means the flexible tubing connection between a service pipe and a water main.
- *** 208.4 **GRADE** – is the slope or fall of a line of pipe with reference to a horizontal plane. In drainage, it is usually expressed as the fall in centimeters per meter or percentage slope of pipe.
- 208.5 **GREASE INTERCEPTOR** – an interceptor of at least 3 cubic meters capacity to serve one or more fixtures and which is remotely located.
- 208.6 **GREASE TRAP** – a device designed to retain grease from one to a maximum of four fixtures.
- **
- ** 208.7 **GROUND WATER** – the water that stands in or passes through the ground.
- ***
- ** 208.8 **GROUP VENT** – a branch vent that performs its functions for two (2) or more traps.

**Section 209
"H"**

- 209.1 **HANGERS** – see Supports.
- ***
- *** 209.2 **HEIGHT OF BUILDING** – the vertical distance from the "Grade Line" to the highest point of the coping of a flat roof or to the top line of a ~~measured~~ roof or to the average height of the highest gable of a pitch or hip-roof.
- 209.3 **HIGH HAZARD** – see Contamination.
- ****
- *** 209.4 **HORIZONTAL BRANCH** – is a drain pipe extending laterally from a soil or waste stack or building drain with or without vertical sections or branches, which receives the discharge from one or more fixture drains and conducts it to the soil or waste stack or to the building drain.

<ul style="list-style-type: none"> * Sec. 62 NPC 1959 ** Sec. 63 NPC 1959 *** Sec. 64 NPC 1959 **** Sec. 65 NPC 1959 ***** Sec. 66 NPC 1959 	<ul style="list-style-type: none"> ***** Sec. 67 NPC 1959 ***** Sec. 68 NPC 1959
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209.5 **HORIZONTAL PIPE** – is any pipe or fitting installed in a horizontal position or which forms an angle of not more than forty-five (45) degrees with the horizontal plane.

• 209.6 **HOUSE DRAIN** – is that part of the lowest horizontal piping of a plumbing system which receives the discharges from soil, waste and other drainage pipes inside of a building and conveys it to the house sewer outside of the building.

** 209.7 **HOUSE SEWER** – is that part of a plumbing system extending from the house drain at a point 0.60 meters from the outside face of the foundation wall of a building to the junction with the street sewer or to any point of discharge, and conveying the drainage of one building site.

*** 209.8 **HOUSE STORM SEWER** – is the pipeline from the building to the public or street storm drainage system.

209.9 **HUBLESS PIPES** – are cast iron soil pipes with plain ends connected together with bolted stainless steel bands and neoprene gaskets.

Section 210 “I”

• 210.1 **INDIRECT WASTE PIPE** – is a pipe that does not connect directly with the drainage system but conveys liquid wastes by discharging into a plumbing fixture, interceptor or receptacle directly connected to the drainage system.

** 210.2 **INDIVIDUAL VENT** – is a pipe installed to vent a fixture trap and which connects with the vent system above the fixture served or terminates in the open air.

*** 210.3 **INDUSTRIAL WASTE** – any and all liquid or water-borne waste from industrial or commercial processes, except domestic sewage.

210.4 **I.P.S.** – means Iron Pipe Size.

**** 210.5 **INSANITARY** – a condition contrary to sanitary principles or injurious to health.

* Sec. 69 NPC 1959

** Sec. 70 NPC 1959

*** Sec. 71 NPC 1959

**** Sec. 72 NPC 1959

***** Sec. 73 NPC 1959

***** Sec. 74 NPC 1959

***** Sec. 75 NPC 1959

Conditions where the word "insanitary" shall apply include the following:

- 210.5.1 Any trap which does not maintain a proper trap seal;
 - 210.5.2 Any opening in a drainage system, except where lawful, which is not provided with an approved water-sealed trap;
 - 210.5.3 Any plumbing fixture or other waste-discharging receptacle or device, not supplied with water sufficient to flush it and maintain it in a clean condition;
 - 210.5.4 Any defective fixture, trap, pipe or fitting;
 - 210.5.5 Any trap, except where exempted in this Code, directly connected to a drainage system, the seal of which is not protected against siphonage and backpressure by a vent pipe;
 - 210.5.6 Any connection, cross-connection, construction or condition, temporary or permanent, which permit or make possible, by any means whatsoever, for any unapproved foreign matter to enter into a water distribution system used for domestic purposes; and
 - 210.5.7 The foregoing enumeration of conditions which the term "insanitary" applies, shall not preclude the application of that term to conditions that are, in fact, insanitary.
- * 210.6 **INTERCEPTOR (CLARIFIER)** – is a device designed and installed to separate and retain deleterious, hazardous or undesirable matters from normal wastes and permits normal sewage or liquid wastes to discharge into the disposal terminal by gravity.
- ** 210.7 **INVERT** – The lowest portion of the interior part of any pipe or conduit that is not vertical.

Section 211 "J"

- 211.1 **JURISDICTION** – the Administrative Authority under the Department of Health, the Department of Public Works & Highways, the Department of Interior and Local Government, the City Mayors of Chartered Cities, Environmental Management Bureau (D.E.N.R) and other government entities that regulate the practice of Registered & Licensed Master Plumbers.

Section 212 "K"

No Definitions.

* Sec. 76 NPC 1959

** Sec. 77 NPC 1959

Section 213
“L”

- 213.1** **LABELED** – equipment or materials bearing a label of a listing agency. All labels shall be embossed, stamped or indelibly marked with stickers, glued on the finished product indicating the weight, specifications and logo of the manufacturer.
- 213.2** **LATERAL** – in plumbing, a secondary pipeline. In sewerage, a common sewer to which no other branch sewer is connected. It receives sewage from building sewer service connections only.
- 213.3** **LATRINE** – a water closet consisting of a continuous trough containing water. The trough extends under two or more adjacent seats. Prohibited by health authorities for permanent installations.
- 213.4** **LAVATORY** – a fixture designed for the washing of the hands or face. Sometimes called a wash basin.
- 213.5** **LEACHING CESSPOOL** – a cesspool that is not watertight.
- 213.6** **LEADER** – (See Conductor) – a pipe connected from building gutter to the downspout or conductor.
- 213.7** **LENGTH OF PIPE** – is measured along its centerline.
- 213.8** **LIQUID WASTE** – is the discharge from any fixture, appliance or appurtenance in connection with a plumbing system which does not receive fecal matter.
- 213.9** **LISTED** – equipment or materials included in a LIST published by a listing agency that maintain periodic inspection on current production of listed equipment or materials and whose listing state either that the equipment or materials complied with approved standards or have been tested and found suitable for use in specified manners.
- 213.10** **LISTING AGENCY** – is an agency accepted by the Administrative Authority in the business of listing or labeling and which maintains a periodic inspection program on current production of listed models, and makes available a published report of such listing where specific information is included that the product has been tested against approved standards and found safe for use in a specific manner.

* Sec. 78 NPC 1959

**** Sec. 81 NPC 1959

** Sec. 79 NPC 1959

***** Sec. 82 NPC 1959

*** Sec. 80 NPC 1959

***** Sec. 83 NPC 1959

- * 213.11 **LOCAL VENT** – a pipe or shaft to convey foul air from a plumbing fixture or a room to the outer air.
- ** 213.12 **LOOP OR CIRCUIT VENT** – a vertical vent connection on a horizontal soil or waste pipe branch at a point downstream of the last fixture connection and turning to a horizontal line above the highest overflow level of the highest fixture connected thereto; the terminus connected to the stack vent in the case of loop venting or to the vent stack nearby in the case of circuit venting.
- 213.13 **LOT** – a single area of land legally recorded or validated by other means acceptable to the Administrative Authority where a building is situated or site of any work regulated by this Code, together with the yard, court, and unoccupied space legally required for the building or works, and which is owned by or in the lawful possession of the owner of the building or works.
- 213.14 **LOW HAZARD** – see Pollution.

Section 214 "M"

- *** 214.1 **MAIN** – any system of continuous piping, which is the principal artery of the system where branches are connected.
- 214.2 **MAIN SEWER** – see Public Sewer.
- **
- ** 214.3 **MAIN VENT** – the principal artery of the venting system to which vent branches are connected.
- ***
- ** 214.4 **MANHOLE** – a large opening in a sewer line or part of a plumbing system constructed with sufficient size for a man to gain access therein for maintenance purposes and facility for changes of line and/or grade of pipeline.
- ***
- *** 214.5 **MASTER PLUMBER** – a person technically and legally qualified and licensed to practice the profession of Master Plumbing without limitations in accordance with Republic Act 1378, having passed the examinations conducted by the Professional Regulation Commission, has received a Certificate of Registration from the Board of Master Plumbing and possesses the current license to practice.

* Sec. 84 NPC 1959	**** Sec. 87 NPC 1959
** Sec. 85 NPC 1959	***** Sec. 88 NPC 1959
*** Sec. 86 NPC 1959	***** Sec. 89 NPC 1959

- 214.6 **MAY** – the word “may” is a permissive term.
- 214.7 **MOBILE HOME PARK SEWER** – that part of the horizontal piping of sanitary drainage system which measures 0.6 meter downstream from the last mobile home site and conveys sewage to a public sewer, private sewer, individual sewage disposal system or other points of disposal.

Section 215
“N”

- 215.1 **NAMPAP** – National Master Plumbers Association of the Philippines.
- 215.2 **NUISANCE** – includes, but is not limited to the following:
- 215.2.1 Any public nuisance known in common law or in equity jurisprudence;
- 215.2.2 Whenever any work regulated by this Code is dangerous to human life or detrimental to health and property; and
- 215.2.3 Inadequate or unsafe water supply and or sewage disposal system.

Section 216
“O”

- 216.1 **OAKUM** – hemp or old hemp rope soaked in oil or tar to make it waterproof.
- 216.2 **OCCUPANCY** – the purpose for which a building is used or intended to be used. The term shall also include the building or room housing used. Change of occupancy is not interpreted to mean change of tenants or proprietors.
- 216.1 **OFFSET** – in a line of piping is a combination of elbows or bends, which brings one section of the pipe out of line but into a line parallel with the original section.

Section 217
“P”

- 217.1 **PERSON** – a natural person, his heirs, executors, administrators or assigns; and also includes a firm, partnership or corporation, its or their successors or assigns or agents of any of the aforesaid

* Sec. 90 NPC 1959

** Sec. 91 NPC 1959

*** Sec. 92 NPC 1959

- 217.2 **PB** – Polybutylene. Tube made of plastic material and colored black. The cross-sectional shape is normally oval and is denoted by its outside diameter or O.D. Normally used as water service connection from main to meter.
- 217.3 **PE** – Polyethylene. Tube made of plastic material and colored black. The cross-sectional shape is circular and is denoted by its outside diameter or O.D.
- 217.4 **PIPE** – a cylindrical conduit or conductor conforming to the particular dimensions commonly known as “pipe size” and is denoted by its interior diameter or I.D.
- * 217.5 **PITCH** – see Grade.
- ** 217.6 **PLUMBING** – the art and technique of installing pipes, fixtures and other apparatuses in buildings for bringing in the supply, liquids, substances and/or ingredients and removing them; and such water, liquid and other carried-wastes hazardous to health, sanitation, life, property; also the pipes and fixtures after installation i.e., the plumbing system.
- 217.7 **PLUMBING APPLIANCE** – any one of a special class of device or equipment intended to perform a special plumbing function. Its operation and/or control may be dependent upon one or more energized components, such as motors, controls, heating elements and pressure-temperature-sensing elements. Such device or equipment may operate automatically through one or more of the following actions: a time cycle, a temperature range, a pressure range, a measured volume or weight; or the device or equipment may be manually adjusted or controlled by the user or operator.
- 217.8 **PLUMBING APPURTEANCE** - a manufactured device or a prefabricated assembly or an on-the-job assembly of component parts, and serves as adjunct to the basic piping system and plumbing fixtures. An appurtenance demands no additional water supply nor does it add any discharge load to a fixture or the drainage system. It performs some useful functions in the operation, maintenance, servicing, economy or safety of the plumbing system.
- 217.9 **PLUMBING FIRM** -- a sole proprietorship or corporation composed of Registered and Licensed Master Plumbers together with allied professionals, with the Master Plumbers composing the majority of the membership, incorporators, directors and/or executive officers and Licensed Master Plumber only render work and services within the cognizance of a Registered Master Plumber and members of the allied professions also only render work and services within the cognizance of their respective professions.

* Sec. 93 NPC 1959

** Sec. 94 NPC 1959

- * 217.10 **PLUMBING FIXTURES** – are approved-type installed receptacles, devices or appliances supplied with water or receive liquid or liquid-borne wastes and discharge such wastes into the drainage system to which they may be directly or indirectly connected. Industrial or commercial tanks, vats and similar processing equipment are not plumbing fixtures, but may be connected to or discharged into approved traps or plumbing fixtures as provided for in this Code.
- ** 217.11 **PLUMBING OFFICIAL** – the Administrative Authority or the officer charged with the administration and enforcement of the National Plumbing Code, or his regularly authorized deputy.
- *** 217.12 **PLUMBING SYSTEM** – includes all potable water supply and distribution pipes, all plumbing fixtures and traps; all sanitary and storm drainage systems; vent pipes, roof drains, leaders and downspouts; and all building drains and sewers, including their respective joints and connections; devices, receptacles, and appurtenances within the property; water lines in the premises: potable, tap, hot and chilled water pipings; potable water treating or using equipment; fuel gas piping; water heaters and vents for same.
- 217.13 **PLUMBING UNIT** – a minimum standard quantity of plumbing fixtures that discharge wastes into a plumbing installation including: one (1) water meter, one (1) water closet, one (1) lavatory, one (1) shower head and drain for a bathtub or shower stall, one (1) kitchen sink, one (1) laundry tray and three (3) floor drains and four (4) faucets/hose bibb.
- 217.14 **POLLUTION** – an impairment of the quality of the water to a degree which creates hazard to the public health and adversely affects the aesthetic and potable qualities of waters for domestic use.
- *** 217.15 **POTABLE WATER** – water satisfactory for drinking, culinary and domestic purposes and meets the requirements of the Philippine National Standards for Drinking Water.
- 217.16 **PRESSURE** – the normal force exerted by a homogeneous liquid or gas, per unit of area on the wall of the container
- 217.16.1 **STATIC PRESSURE** – the pressure existing without any flow motion.

* Sec. 95 NPC 1959

** Sec. 97 NPC 1959

*** Sec. 96 NPC 1959

**** Sec. 98 NPC 1959

- 217.16.2 **RESIDUAL PRESSURE** – the pressure available at the fixture or water outlet; allowance is made for pressure drop due to friction loss, head, meter and other losses in the system during maximum demand period.
- * 217.17 **PRIMARY BRANCH** – of the building drain is the single sloping drain from the base of a stack to its junction with the main building drain.
- ** 217.18 **PRIVATE OR PRIVATE USE** – In classification of plumbing fixtures, “private” applies to plumbing fixtures in residences and apartments, to private bathrooms in hotels and hospitals, to rest rooms in commercial establishments for restricted use, single fixture or group of single fixtures and to similar installations where the fixtures are intended for the use of a family or an individual.
- 217.19 **PRIVATE SEWAGE DISPOSAL SYSTEM** – a septic tank with the effluent discharging into a subsurface disposal field, into one or more seepage pits or into a combination of subsurface disposal field and seepage pit or of such other facilities as may be permitted under the procedures set forth elsewhere in this Code.
- *** 217.20 **PRIVATE SEWER** – a building sewer, which receives the discharge from more than one building drain and conveys it to a public sewer, private sewage disposal system, or other points of disposal.
- **
** 217.21 **PRIVY** – an outhouse or structure used for the deposition of excrement.
- ***
** 217.22 **PRIVY VAULT** – a pit beneath a privy where excrement collects.
- ***
*** 217.23 **PUBLIC OR PUBLIC USE** – In the classification of plumbing fixtures, “public” or “public use” shall mean all buildings or structures that are not defined as private or private use.
- ****
*** 217.24 **PUBLIC SEWER** – a common sewer directly controlled by public authority to which all abutters have equal rights of connections.
- 217.25 **PVC** – Polyvinyl Chloride. Potable water pipings are color-coded **BLUE**. Drainpipes are manufactured with toxic components and are color-coded gray, orange or brown.

* Sec. 99 NPC 1959 ** Sec. 100 NPC 1959 *** Sec. 101 NPC 1959 **** Sec. 102 NPC 1959	***** Sec. 103 NPC 1959 ***** Sec. 104 NPC 1959 ***** Sec. 105 NPC 1959
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**Section 218
"Q"**

218.1 **QUALITY OF MATERIALS** – all plumbing fixtures and materials used in any discharge or plumbing system or parts thereof shall be free from defects.

**Section 219
"R"**

219.1 **RECEPTOR** – an approved plumbing fixture or device of such materials, shape and capacity to adequately receive the discharge from indirect waste pipes, constructed and located to be readily cleaned.

219.2 **REGULATING EQUIPMENT** – include all valves and controls used in plumbing systems which are accessible.

• 219.3 **RELIEF VENT** – a vertical vent line, the primary function of which is to provide additional circulation of air between the drainage and vent systems or to act as an auxiliary vent on a specially designed system such as a "yoke vent" connection between the soil and vent stacks.

** 219.4 **REPAIR** – the reconstruction or renewal of any part of an existing building for its maintenance. The word "repair" or "repairs" shall not apply to any change of construction or occupancy.

*** 219.5 **RETURN BEND** – an open return bend usually made up two 90° bends with inside and outside threads, flanged or welded fittings; and applied also to a one hundred eighty degrees bend in copper tubings.

** 219.6 **REVENT PIPE** – see backvent pipe.

219.7 **RIM** – an unobstructed top open edge of a fixture.

** 219.8 **RISER** – a water supply pipe, which extends vertically to one full story or more to convey water into pipe branches or plumbing fixtures.

*** 219.9 **ROUGHING-IN** – the installation of all pipings and fitting parts of the plumbing system, which can be completed prior to the installation of fixtures and accessories. These include sanitary and storm drainage, tap, hot and chilled water supplies, gas pipings, vent pipings and the necessary fixture supports.

* Sec. 106 NPC 1959

** Sec. 107 NPC 1959

*** Sec. 108 NPC 1959

**** Sec. 109 NPC 1959

***** Sec. 110 NPC 1959

***** Sec. 111 NPC 1959

Section 220**"S"**

- 220.1 **SAND INTERCEPTOR** – see Interceptor.
- * 220.2 **SANITARY SEWAGE** – the wastewater containing human excrements and liquid household waste. Also called domestic sewage.
- ** 220.3 **SANITARY SEWER** – a sewer intended to receive sanitary sewage with or without pre-treated industrial wastes and without the admixture of rain or ground water.
- *** 220.4 **SEAL** – the vertical distance between the dip and the crown weir of a trap. Also, the water in the trap between the dip and the crown weir.
- **
- ** 220.5 **SECONDARY BRANCH** – any branch in a building drain other than the primary branch.
- 220.6 **SEEPAGE PIT** – a loosely lined excavation in the ground, which receives the discharge of a septic tank and designed to permit the effluent from the septic tank to seep through pit bottom and sides.
- ***
- ** 220.7 **SEPTIC TANK** – a water-tight receptacle which receives the discharge of a sanitary plumbing system or part thereof, designed and constructed to retain solids, digest organic matter through a period of detention and to allow the liquids to discharge into the soil outside of the tank through a system of open-jointed sub-surface pipings or a seepage pit meeting the requirements of this Code.
- ***
- *** 220.8 **SERVICE PIPE** – the pipe from the street water main or other source of water supply to the building served.
- ****
- *** 220.9 **SEWAGE** – any wastewater containing animal or vegetable matter in suspension or solution and may include liquids containing chemicals in solution.
- *****
- **** 220.10 **SEWER** – a pipe or conduit for carrying sewage and wastewater.
- *****
- **** 220.11 **SEWERAGE OR SEWERAGE WORKS** – a comprehensive term, including all constructions for collection, transportation, pumping, treatment and final disposition of sewage.
- *****
- ***** 220.12 **SHAFT** – a vertical opening through a building for elevators, dumbwaiters, lights, ventilation or similar purposes.

* Sec. 112 NPC 1959

***** Sec. 117 NPC 1959

** Sec. 113 NPC 1959

***** Sec. 118 NPC 1959

*** Sec. 114 NPC 1959

***** Sec. 119 NPC 1959

**** Sec. 115 NPC 1959

***** Sec. 120 NPC 1959

***** Sec. 116 NPC 1959

***** Sec. 121 NPC 1959

- 220.13 **SIAMESE CONNECTION** – a hose fitting with clapper valves for combining the flow from two or more lines of hose into a single stream. The inlet fitting of a fire standpipe located above ground level.
- 220.14 **SIPHONAGE** – a suction created by the flow of liquids in pipes. A pressure less than atmospheric.
- 220.15 **SHALL** – the word “shall” denotes mandatory acceptance.
- 220.16 **SHIELDED COUPLING** – an approved elastomeric sealing gasket with an approved outer shield and a tightening mechanism.
- 220.17 **SINGLE FAMILY DWELLING** – a building designed as a home by the owner of such building, and shall be the only dwelling located on a parcel of ground with the usual accessory building.
- 220.18 **SIZE AND TYPE OF TUBING** – see Diameter.
- 220.19 **SLIP JOINT** – an adjustable tubing connection, consisting of a compression nut, a friction ring, and a compression washer, designed to fit a threaded adapter fitting or a standard taper pipe thread.
- 220.20 **SLOPE** – see Grade.
- 220.21 **SOIL STACK PIPE** – a vertical soil pipe conveying fecal matter and wastewater.
- 220.22 **SOIL PIPE** – any pipe, which conveys the discharge of water closet, urinal or fixtures having similar functions, with or without the discharges from other fixtures to the building drain or building sewer.
- 220.23 **SOLDERED JOINT** – a pipe joint obtained by joining metal parts with metallic mixtures or alloys which melt at a temperature below 427 degrees centigrade and above 149 degrees centigrade.
- 220.24 **SPIGOT** – the end of a pipe which fits into a bell. Also a word used synonymously with faucet.
- 220.25 **SPECIAL WASTES** – wastes which require some special methods of handling such as the use of indirect waste piping and receptors; corrosion-resistant piping; sand, oil or grease interceptors; condensers or other pretreatment facilities.

* Sec. 123 NPC 1959

**** Sec. 126 NPC 1959

** Sec. 124 NPC 1959

***** Sec. 125 NPC 1959

*** Sec. 122 NPC 1959

***** Sec. 127 NPC 1959

- * 220.26 **STACK** – the vertical main of a system of soil, waste or vent pipings extending through one or more stories and extended thru the roof.
- ** 220.27 **STANDPIPE** – a vertical pipe, or a reservoir, into which water is pumped to give it at a head, classified as:
1. **Wet Standpipe** – water pressure is maintained at all times;
 2. **Automatic Standpipe System** – operates automatically by opening a hose valve;
 3. **Manually-Operated Standpipe System** – remote control device at each hose station; and
 4. **Dry Standpipe** – having no permanent water inside the pipe.
- *** 220.28 **STORM WATER** – that portion of the rainfall or other precipitation which runs off over the earth surface after a storm.
**
- ** 220.29 **STOREY** – that portion of a building included between the upper surface of any floor and the upper surface of the floor next above.

- ** 220.30 **SUBSOIL DRAIN** – an underground drainpipe that receives only sub-surface or seepage water and convey it to a sump for disposal by gravity flow or by lift pump.

- *** 220.31 **STACK VENT** – the extension of a soil or waste stack above the highest horizontal drain connected to the stack. The uppermost end above the roof is called stack vent through roof (SVTR).

- *** 220.32 **SUMP** – an approved tank or pit which receives sewage or wastewater and is located below the normal grade of the gravity system and must be emptied by mechanical means.

- **** 220.33 **SUPPORTS** – supports, hangers, anchors, brackets, cradles are devices for holding and securing pipes and fixtures to walls, ceiling, floors or structural members.

- **** 220.34 **SURFACE WATER** – that portion of rainfall or other precipitation which runs off over the surface of the ground.

- ***** 220.35 **SWIMMING POOL** – a water basin used for swimming designed to accommodate many bathers at a time and properly connected to a disposal system, fills and draws water supply or provided with approved water purification and recirculation system.
- * Sec. 128 NPC 1959 ***** Sec. 129 NPC 1959
 ** Sec. 130 NPC 1959 ***** Sec. 134 NPC 1959
 *** Sec. 131 NPC 1959 ***** Sec. 135 NPC 1959
 **** Sec. 132 NPC 1959 ***** Sec. 136 NPC 1959
 ***** Sec. 133 NPC 1959 ***** Sec. 137 NPC 1959

Section 221

"T"

- 221.1 **TAILPIECE** – the pipe or tubing that connects the outlet of a plumbing fixture to the trap.
- * 221.2 **TAPPED TEE** – a tee with the branch tapped to receive a threaded pipe or fittings.
- ** 221.3 **TRAP** – a fitting or device designed and constructed to provide, when properly vented, a liquid seal which prevents the backflow of foul air or methane gas without materially affecting the flow of sewage or wastewater through it.
- 221.4 **TRAP ARM** – that portion of a fixture drain between a trap and the vent.
- *** 221.5 **TRAP SEAL** – the maximum vertical depth of liquid that a trap will retain, measured between the crown weir and the top of the dip of the trap.
- 221.6 **TUBE** – a cylindrical conduit or conductor conforming to the particular dimensions known as "tube sizes" and denoted by its outside diameter or O.D.

Section 222

"U"

- 222.1 **UNCONFINED SPACE** – a room space having a volume equal to at least 1.4 cu. m. of the aggregate input rating of the fuel-burning appliance installed in that space. Rooms adjacent and open to the space where the appliance is installed, through openings not furnished with doors, are considered a part of the unconfined space.
- **
- *** 222.2 **UNIT VENT** – an arrangement of venting so installed that one vent pipe will serve two (2) traps.

Section 223

"V"

- ***
- ** 223.1 **VACUUM** – an air pressure less than atmospheric. Also, implies siphonage in piping system.
- 223.2 **VACUUM BREAKER** – see Backflow Preventer.

* Sec. 138 NPC 1959

** Sec. 139 NPC 1959

*** Sec. 140 NPC 1959

**** Sec. 141 NPC 1959

***** Sec. 142 NPC 1959

- * 223.3 **VENT PIPE** – a pipe or opening used for ensuring the circulation of air in a plumbing system and for relieving the negative pressure exerted on trap seals.
- 223.4 **VENT STACK** – the vertical vent pipe installed primarily for providing circulation of air to and from any part of the soil, waste or the drainage system.
- 223.5 **VENT SYSTEM** – pipes installed to provide flow of air to or from a drainage system or to provide a circulation of air within such system to protect traps seals from siphonage and backpressure.
- 223.6 **VERTICAL PIPE** – any pipe or fitting installed in a vertical position or which forms an angle of not more than forty-five (45) degrees with the vertical line.

Section 224
"W"

- 224.1 **WASTE** – see Liquid Waste and Industrial Waste.
- *** 224.2 **WASTE PIPE** – a pipe, which conveys only wastewater or liquid waste, free of fecal matter.
- 224.3 **WATER TREATMENT** – a device which conditions or treats water supply to improve water quality, remove suspended solids by filtration.
- 224.4 **WATER – DISTRIBUTING PIPE** – a pipe which conveys potable water from the building supply pipe to the plumbing fixtures and other water outlets.
- 224.5 **WATER MAIN** – or street main is the water-supply pipe for public or community use.
- 224.6 **WATER SUPPLY SYSTEM** – of a building or premises consists of the water service pipe, water supply line, water distributing pipe and the necessary branch pipes, fittings, valves and all appurtenances required for the supply of potable water.
- **
- ** 224.7 **WET VENT** – that portion of a vent pipe through where wastewater also flows through.
- 224.8 **WELDED JOINT OR SEAM** - any joint or seam obtained by the joining of metal parts in a plastic molten state.

* Sec. 143 NPC 1959
 ** sec. 144 NPC 1959

*** Sec. 146 NPC 1959
 **** Sec. 145 NPC 1959

- 224.9 **WELDER, PIPELINE** – a person who specializes in the welding of pipes and holds a valid certificate of competency from a recognized testing agency, based on the requirements of the regulating authority.
- 224.10 **WYE** – a hose connection with two-gated outlets permitting two connections of the same or smaller coupling diameter to be taken from a single supply line. Also, a pipe fitting of three branches that form the letter "wye".

**Section 225
"X"**

No definitions.

**Section 226
"Y"**

- * 226.1 **YARD** – an open, unoccupied space, other than a court, unobstructed from the ground to the sky, except where specifically provided in this Code.
- 226.2 **YOKA VENT** – a pipe connecting upward from a soil or waste stack below the floor and below horizontal connection to an adjacent vent stack at a point above the floor and higher than highest spill level of fixtures for preventing pressure changes in the stacks.

**Section 227
"Z"**

No definitions.

* Sec. 147 NPC 1959

Chapter 3

GENERAL REGULATIONS

Section 301 – DISPOSAL OF WASTEWATERS

It shall be unlawful for any person to cause, suffer or permit the disposal of sewage, human excrement or other waste waters in any place or manner, except through and by means of an approved Excreta and Storm Drainage Systems installed and maintained in accordance with the provisions of this Code.

*** Section 302 – GRADE OF HORIZONTAL DRAINAGE PIPING**

Horizontal drainage pipes shall be run in practical alignments and at a uniform slope between manholes of not less than 20 mm/m or 2% toward the point of disposal, provided that, where it is impracticable to obtain a 2% slope due to the following constraints in: (1) excessive depth of the proposed drainage line; (2) structural and/or geological features of the terrain; and (3) existing adverse arrangements of building or structure; any such pipe or piping 102 mm or larger in diameter may have a slope of 10 mm/m or 1% provided it is first approved by the Administrative Authority.

**** Section 303 – CHANGES IN DIRECTION OF DRAINAGE FLOW**

- 303.1 Changes in direction of drainage piping shall be made by the use of approved pipe fittings and shall be of the angles presented by a 22 1/2° bend, 45° bend, 60° bend or other approved fittings of longer sweeps.
- 303.2 Horizontal drainage lines connecting to a vertical stack shall enter through 45° or 60° wye branches, combination wye and 1/8 bend branches, sanitary tee or other approved fittings of longer sweeps. No fitting having more than one inlet at the same level shall be used unless such fitting is constructed so that the discharge from one inlet cannot readily enter into the other inlet. Vertical installation of double sanitary tees may be used when the barrel of the fitting is at least two (2) pipe sizes larger than the largest side inlet. Nominal pipe sizes recognized for these purposes are: 51, 63, 76, 89, 102, 114, 127 & 152 mm. diameters.
- 303.3 Horizontal drainage lines connecting to other horizontal drainage lines shall enter through 45° wye branches, combination wye and 1/8 bend branches or other approved fittings of longer sweeps.

** Sec. 154 NPC 1959*

*** Sec. 157 NPC 1959*

- 303.4 Vertical drainage lines connecting to horizontal drainage line shall enter through 45-degree branches, or other approved fittings of longer sweep. Sixty (60) degree branches or offsets may be used only when installed in a true vertical position.

Section 304 – CONNECTIONS TO PLUMBING SYSTEM REQUIRED

All plumbing fixtures, drains, appurtenances and appliances used to receive or discharge liquid wastes or sewage, shall be connected properly to the drainage systems of the building and premises, in accordance with the requirements of this Code.

Section 305 – SEWER REQUIRED

- 305.1 Every building where plumbing fixtures are installed shall have a sewer service connection to a public or private sewer systems except as provided in Subsection 305.2 of this section.
- 305.2 When a Public or Private Sewer is not available for use, excreta drainage piping from buildings and premises shall be connected to an approved Private Sewage Disposal System

Section 306 – DAMAGE TO DRAINAGE SYSTEM OR PUBLIC SEWER

- 306.1 It shall be unlawful for any person to deposit, by whatever means into any plumbing fixture, floor drain, interceptor, sump, receptacle or device, connected to the excreta and storm drainage systems, public sewer, private sewer, septic tank or cesspool, any ashes, cinders, solids, rags, flammable, poisonous or explosive liquids or gases; oils, greases or other things which would or could cause damage to the drainage system or public sewer.
- 306.2 Roofs, inner courts, vent shafts, light wells or similar areas having rainwater drains shall discharge outside of the building or to the gutter, and shall not be connected to the soil and waste pipe systems.

Section 307 – INDUSTRIAL WASTES

- 307.1 Wastes detrimental to the public sewer system or to the functioning of the sewage treatment plant shall be treated and disposed of as found necessary and as directed by the Administrative Authority or other authorities having jurisdiction

- 307.2 Sewage or other waste from a plumbing system which may be deleterious to surface or subsurface waters, shall not be discharged into the ground or into any waterway unless first rendered innocuous through subjection to some acceptable form of treatment.

Section 308 – LOCATION

- 308.1 Except as otherwise provided in this Code, no excreta plumbing system, storm drainage system, building drain, building sewer, private sewage disposal system or parts thereof, shall be located in any lot other than the lot where the site of the building, structure or premises are served by such facilities.
- 308.2 No subdivision, sale, or transfer of ownership of existing property shall be made in such a manner that the area, clearance, and access requirements of this Code are decreased or impaired.

Section 309 – IMPROPER LOCATION

Piping, fixtures or equipment shall not be so located to interfere with the normal function or use thereof or with the normal operation and use of windows, doors or other required facilities.

*** Section 310 – WORKMANSHIP**

- 310.1 All designs, constructions and workmanships shall be in conformity with accepted engineering practices and shall be of such character as to secure the results sought to be obtained by this Code.
- 310.2 It shall be unlawful to conceal cracks, holes, or other imperfection in materials by welding, brazing or soldering the defects or by using therein or thereon any paint, wax, tar, or other sealing or repair agents.
- 310.3 Burred ends of all pipes and tubings shall be reamed to the full bore of the pipe or tubing and all chips left inside the pipe or tubing shall be removed.

**** Section 311 – PROHIBITED FITTINGS AND PRACTICES**

- 311.1 No double hub fitting for lead-caulked joint in vertical position, single or double tee branch; single or double tapped tee branch, side inlet quarter bend, running thread, band or saddle shall be used as a drainage fitting, except that a double hub sanitary tapped tee may be used on vertical lines as a fixture connection. (Approved stainless steel bands with neoprene gaskets for jointing of hubless cast iron soil pipes are acceptable for use.)

** Sec. 156 NPC 1959*

*** Sec. 158 NPC 1959*

- 311.2 No drainage or vent piping shall be drilled and tapped for making connections thereto, and no cast iron soil pipe shall be threaded.
- 311.3 No waste connection shall be made to a closet bend or stub of a water closet or similar fixtures.
- 311.4 Except as hereinafter provided in Sections 812, 813 and 814 of this Code, no vent pipe shall be used as a soil or waste pipe, nor shall any soil or waste pipe be used as a vent. Also, single drainage and venting systems with unvented branch lines are prohibited.
- 311.5 No fitting, fixture and piping connections, appliance, device or method of installation which obstructs or retards the flow of water, sewage or air in the excreta and storm drainage and venting systems in an amount greater than the normal frictional resistance to flow, shall be used unless it is indicated as acceptable in this Code or approved by the Administrative Authority as having the desirable and acceptable function and of ultimate benefit to the proper and continuous functioning of the plumbing system. The enlargement of a 76-mm closet bend or stub to 102-mm diameter shall not be considered as an obstruction.
- 311.6 Except for necessary use of gate & check valves, where inter-membering or mixing of dissimilar metals occurs, the points of connection shall be confined to exposed or accessible locations.
- 311.7 All valves, pipes and fittings shall be installed in correct relationship to the direction of flow.

Section 312 – INDEPENDENT SYSTEM

The drainage system of each new building and of new work installed in any existing building shall be separate and independent from that of any other building and when available, every building shall have an independent connection with a private or public sewer.

Exception: *Where one building stands in the rear of another building on an interior lot, and no private sewer line is available nor can be constructed to the rear building through an adjoining court, yard or driveway, the building drain from the front building may be extended to the rear building if the existing size is adequate for both buildings and gravity flow is possible.*

Section 313 – REPAIRS AND ALTERATIONS

- 313.1 In existing building or premises where plumbing installations are to be altered, repaired or renovated, deviations from the provision of this Code are permitted, provided such deviations are necessary and first approved by the Administrative Authority.
- 313.2 Existing building sewer and building drain may be used in connection with a new building or new plumbing and drainage works only when they are found on examination and tested to conform in all respects to the requirements governing new work, and the proper Administrative Authority shall notify the Owner to make changes necessary to conform to this Code. No building or part thereof, shall be erected or placed over any part of the existing drainage system, which is constructed of materials other than those approved elsewhere in this Code for use under or within a building.
- 313.3 All openings into a Sanitary drainage and vent system, except those openings to which plumbing fixtures are properly connected or which constitute vent terminals, shall be permanently plugged or capped in an approved manner, using the appropriate materials required by this Code.

*** Section 314 – PROTECTION OF PIPING, MATERIALS AND STRUCTURES**

- 314.1 All pipings passing under or through walls shall be protected from breakage with embedded metal pipe sleeves. All pipes passing through or under cinders or other corrosive materials shall be protected from external corrosion by encasing same with polyethylene sheath or in other approved manner. Approved provisions shall be made for expansions of hot water pipings. Void between pipes and sleeves through concrete floors in the ground shall be appropriately sealed with bitumen.
- 314.2 All pipes in connection with the plumbing system shall be installed so that the piping or connections will not be exposed to undue strains or stresses, and provisions shall be made for pipe expansions and contraction, and bending due to structural settlement. No pipe shall be directly embedded in concrete and masonry walls without metal sleeve. No structural member shall be seriously weakened or impaired by cutting, notching or otherwise.
- 314.3 The bottom of all pipe trenches deeper than the footing of any adjacent building or structure and parallel to it must be at least forty-five (45) degrees therefrom, unless permission is granted by the Administrative Authority.

* Sec. 155 NPC 1959

- 314.4** No building sewer or other drainage pipings or part thereof, constructed of materials other than that approved for use under or within the building, shall be installed under or within 0.6 meter of any building or structure, nor less than 0.3 meter below the finish ground surface.
- 314.5** Pipe surfaces subject to undue corrosion, erosion or mechanical damage shall be protected with approved material and manners such as inside lining, outside coating and proper bottom bedding and top shielding with concrete blocks.

Section 315 – HANGERS AND SUPPORTS

315.1 Vertical Piping

Attachment – vertical piping shall be secured at sufficiently close intervals to keep the pipes in alignment and to carry its weight and contents. Stacks shall be supported at their base as follows:

- 315.1.1 Cast Iron Soil Pipe** – Bell & Spigot and Hubless pipe shall be supported at every storey or closer.
- 315.1.2 Screwed Pipe** – Iron Pipe Size (IPS) shall be supported at not less than every other storey height.
- 315.1.3 Copper Tubing** – shall be supported at each storey or at maximum intervals of 3 meters on center.
- 315.1.4 Lead Pipe** – shall be supported at intervals not exceeding 1.20 meters at centers with a rigid vertical back-up
- 315.1.5 Plastic Pipe** – shall be supported at every one- (1) meter interval.

315.2 Horizontal Piping

- 315.2.1 Supports** – horizontal pipes shall be supported at sufficiently close intervals to keep them in alignment and prevent sagging.
- 315.2.2 Cast Iron Soil Pipe** – Where joints occur, suspended cast iron soil pipe shall be supported at not more than 1.5 meters intervals; except that pipe exceeding 1.5 meters length, may be supported at not more than 3 meters intervals. Supports shall be adequate to maintain alignment and to prevent sagging and shall be placed within 0.45 meters of the hub or joint. Hubless or compression gasket joints must be supported at least at every other joint except that when the developed length between supports exceeds 1.2 meters, they shall be provided at

each joint. Support shall also be provided at each horizontal branch connection, placed on or immediately adjacent to the piping. Suspended lines shall be suitably braced to prevent horizontal movement.

- 315.2.3 **Screwed Pipe – IPS** except as provided in other Sections of this Code, shall be supported at approximately 3.0 meters intervals for piping 19 mm diameter and smaller and 3.6 meters intervals for piping 25 mm and larger in diameter.
- 315.2.4 **Copper Tubing** – shall be supported at approximately 1.8 meters intervals for piping 38 mm diameter and smaller and 3.0 meters intervals for pipings 51 mm and larger in diameter.
- 315.2.5 **Lead Pipe** – shall be supported by stiff metal or wooden backing for its entire length with hangers properly spaced.
- 315.2.6 **In Ground** – piping buried in the ground shall be laid on a firm bed for its entire length, except where concrete cradle support is provided, which is adequate and approved by the Administrative Authority.
- 315.2.7 **Plastic Tube** – shall be supported by stiff metal or wood backing with hangers in its entire length for small-size tubings up to 38 mm diameter and without backings but with spaced metal hangers at approved spacing for larger-size tubings.

315.3 Hangers and Anchors

- 315.3.1 **Materials** – for hangers and anchors shall be of sufficient strength to maintain their proportional share with the weight of the pipe and its content.
- 315.3.2 All pipings, fixtures and equipment shall be adequately anchored or supported to the satisfaction of the Administrative Authority.

Section 316 – TRENCHING, EXCAVATION AND BACKFILL

- 316.1 Tunneling and driving may be done in yard, court or driveway of any building site. Where there is sufficient depth, tunneling may be used between open cut trenches. Tunnels shall have a clear height of 0.6 meter above the pipe and shall be limited in length to one-half (1/2) the depth of the trench, with a maximum length of 2.4 meters. When pipe is driven, the drive pipe shall be at least one pipe size larger than the pipe to be laid.

- 316.2 **Open Trenches** – all excavations required to be made for the installation of a building drainage system or any part thereof, within the walls of a building, shall be open trench work and kept open until the piping has been inspected, tested and accepted.
- 316.3 All excavations shall be completely back-filled as soon as possible after inspection. Adequate precaution shall be taken to ensure proper compactness of backfill around pipes without damage to such pipe. Trenches shall be back-filled in thin layers of 0.3 meter above the top of the pipe with clean earth which shall not contain stones, boulders, cinders or other materials which can damage or break the pipes or cause corrosive action. Mechanical devices or equipment such as bulldozer, grader, etc., may then be used to complete the back-filling to grade. The filling shall be properly compacted. Suitable precautions shall be taken to ensure permanent stability for pipes laid in filled or made ground.

Chapter 4

PLUMBING FIXTURES

*** Section 401 – MATERIALS – GENERAL REQUIREMENTS**

Quality of Fixtures – plumbing fixtures shall be manufactured of dense, durable, non-absorbent materials and must have smooth, impervious surfaces, free from unnecessary concealed fouling surfaces. Except as permitted elsewhere in this Code, all fixtures shall conform in quality and design to nationally recognized applicable standards or to other approved standards acceptable to the Administrative Authority. All porcelain enamel surfaces on plumbing fixtures shall be acid resistant (for the convenience of users of this Code, a list of generally accepted Plumbing Fixtures is included in Table 14-4 Plumbing Material Referenced Standards.)

Water closet bowls for public use shall be the elongated bowl types equipped with open-front seats. Water closet seats shall be of smooth non-absorbent material and properly sized for the water closet bowl used.

Section 402 – MATERIALS – ALTERNATIVES

Special-use fixtures may be made of soapstone, chemical stoneware or may be lined with lead, copper base alloy, nickel-copper alloy, corrosion-resisting steel or other materials specially suited for the use which the fixture is intended.

Restaurant kitchen and other special-use sinks may be made of approved-type bonderized and galvanized sheet steel of not less than Gauge No. 16 U.S. B&S or 1.6 mm thick. All sheet metal plumbing fixtures shall be adequately designed, constructed and braced in an approved manner to satisfactorily accomplish the intended purposes.

**** Section 403 – OVERFLOWS**

When any fixture is provided with an overflow outlet, the waste shall be so arranged that the standing water inside the fixture cannot rise inside the overflow way when the stopper is closed nor remain inside the overflow way when the fixture is empty. The overflow pipe from a fixture shall be connected to the house or inlet side of the fixture trap. Water Closet or Urinal flush tanks shall discharge into the bowls or wares served by them, but it shall be unlawful to connect such overflows with any other part of the drainage system.

* Sec. 205 NPC 1959

** Sec. 210 NPC 1959

Section 404 – STRAINERS AND CONNECTIONS

- 404.1 Strainers – all plumbing fixtures other than water closets and siphon action washdown or blowout urinals, shall be equipped with approved strainers having an approved waterway area. The strainers serving shower drains shall have waterway equivalent to the area of the tailpiece; (meaning, the sum of all the areas of the perforations of the strainer is equivalent to the outlet area).
- 404.2 Connections – Fixtures having concealed slip joint connections shall be provided with an access panel or utility at least 0.3 meter in its least dimension and arranged so that the connections are readily accessible for inspection and repair.
- 404.3 Continuous waste and fixture tailpiece shall be constructed from the materials specified on Table 14-4 of this Code for drainage piping, provided however, that such connections where exposed or accessible may be of seamless drawn brass not less than Gauge No. 20 B & S or 0.8 mm in thickness. Each such tailpiece, continuous waste or waste and overflow shall not be less than 38 mm O.D. for sinks, dishwashers, laundry tubs, bathtubs, urinals and similar fixtures, and not less than 32 mm O.D. for lavatories, drinking fountains and similar small fixtures; brass or copper shall not be used for urinal tailpiece or trap.
- 404.4 Approved wye or other directional-type branch fittings shall be installed in all continuous wastes connecting or receiving the discharge from food waste disposal units, dishwashers, clothes washers or other forced-discharge fixtures or appliances. No dishwasher drain shall be connected to a sink tailpiece, continuous waste or trap on the discharge side of a food waste disposal unit.

*** Section 405 – PROHIBITED FIXTURES**

- 405.1 Use of water closets having invisible seals or unventilated space or having walls, which are not thoroughly washed out at each discharge, shall be prohibited. Any water closet, which might permit siphonage of the contents of the bowl back into the water tank, shall be prohibited as well as trough urinals. Drinking fountains shall not be installed inside public toilet rooms.
- 405.2 Fixed wooden, concrete, cement, or tile washtubs or sinks for domestic use shall not be installed in any building designed for human habitation. No sheet metal lined wooden bathtubs shall be installed or reconnected. No dry or chemical closet (toilet) shall be installed in any building for human habitation, unless first approved by the Health Officer or Administrative Authority.

* Sec. 207 NPC 1959

Section 406 – SPECIAL FIXTURES AND SPECIALTIES

- 406.1 **Water Connections** – baptistries, ornamental and lily ponds, aquaria, ornamental fountain basins and similar constructions when provided with water supplies connected to potable water supply lines shall be protected from back-siphonage.
- 406.2 **Wastewater Drain** – for “Sacrament” cupsink at church altar and Baptisteries font outlet shall discharge direct to the ground and not connected to the sanitary drainage system.
- 406.3 **Approved** – specialties requiring water supply and waste discharge connections shall be submitted for approval of the Administrative Authority.

Section 407 – INSTALLATION

- 407.1 **Cleaning** – plumbing fixture shall be installed in a manner to provide easy access for repair and cleaning. Where practical, all pipes from fixtures shall be run parallel and close to the nearest wall or building line.
- 407.2 **Joints** – where a fixture comes in contact with the wall or floor, the joint between the fixture and wall or floor shall be made watertight.
- 407.3 **Securing Fixtures** – floor outlet or floor mounted fixtures shall be rigidly secured on the drainage connection and floor when so designed with the use of adequately-sized screws or expansion bolts of copper, brass or other equally corrosion-resistant material.
- 407.4 **Wall-Hung Fixtures** – wall-hung fixtures shall be rigidly supported by metal supporting members or chairs so that no bending or pullout strain is transmitted to the wall. Approved non-corrosive screws or bolts shall secure water closet and urinal flush tanks and similar appurtenances.
- 407.5 **Setting** – fixtures shall be set level and in proper alignment with reference to adjacent walls. No water closet or bidet shall be set closer than 0.375 meter from its center to any side wall or obstruction nor closer than 0.75 meter center to center to any similar fixture. No urinal shall be set closer than 0.3 meter from its center to any sidewall or partition nor closer than 0.6 meter center to center.
- 407.6 **Supply Fittings** – the supply lines or fittings for every plumbing fixture shall be installed to prevent backflow.

Section 408 - URINALS

An approved type vacuum breaker shall protect every water supply to a urinal or other approved backflow prevention device as described in Table 14-4.

- 408.1 **Automatic Flushing Tanks** – tanks flushing more than one urinal shall be automatic in operation and of sufficient capacity to provide the necessary volume of water to flush and properly cleanse all urinals simultaneously. Automatically controlled flushometer valves maybe substituted for automatic flush tanks.
- 408.2 **Flushometer Valves** – no manually controlled flushometer valve shall be used to flush more than one urinal and each such urinal flushometer valve shall be approved, self-closing type discharging a predetermined quantity of water.

Section 409 – FLOOR DRAINS AND SHOWER STALLS

- 409.1 Floor drains shall be considered plumbing fixtures and each drain shall be provided with an approved-type and hinged strainer plate having the sum of the areas of the small holes of the strainer plate or gross waterway is equivalent to the cross-sectional area of the tailpiece. Floor drains, floor receptors and shower drains shall be of an approved type, the body provided with integrally-cast water-stop outside flange around the body at mid depth and with an inside caulk outlet to provide a watertight joint in the floor.
- 409.2 Shower receptors are plumbing fixtures and shall conform to the general requirements therefore contained in Table 14-4. Each shower receptor shall be constructed of vitrified china or earthenware, ceramic tile, porcelain-enamelled metal or of such other material as may be acceptable to the Administrative Authority. No shower receptors shall be installed unless it conforms to acceptable standards as required by Chapter 14 of this Code or until a specification or a prototype or both of such receptor is first submitted to the Administrative Authority for approval.
- 409.3 Each shower receptor shall be an approved type and be constructed to have a finished dam, curb or threshold which is at least 25.4 mm lower than the outside floor at the sides and back of such receptor. In no case shall any dam or threshold be less than 51 mm nor more than 228 mm in depth when measured from the top of the dam or threshold to the of the drain. The finished floor of the receptor shall slope uniformly from the sides towards the drain not less than 2% or 20 mm/m or more than 4% or 40 mm/m. Thresholds shall be of sufficient width to accommodate a minimum 559-mm wide door.

Exception: Special shower compartments for wheelchair use may eliminate the curb or threshold. The required slope and depth shall be maintained from the door entry to the drain opening. The minimum distance between the door or entry to the drain opening shall be 1.2 meters.

409.4 All shower compartments, regardless of shape, shall have a minimum finished interior area of 0.6 square meter, and shall also be capable of encompassing a 762 mm diameter circle. The minimum area and dimensions shall be maintained from a point above the shower drain outlet to a height of 1.78 meters with no protrusions other than the fixture valve or valves, shower head and safety grab bars or rails.

409.5 When the construction of on-site built-up shower receptors is permitted by the Administrative Authority, one of the following means shall be employed:

409.5.1 Shower receptors built directly on the ground:

Shower receptors built directly on the ground shall be watertight and shall be constructed from approved-type dense, non-absorbent and non-corrosive materials. Each receptor shall be adequately reinforced, provided with an approved flanged floor drain designed to make a watertight joint in the floor, and shall have smooth, impervious and durable surfaces.

409.5.2 Shower receptors built above ground:

When shower receptors are built above ground the sub-floor and rough side of walls to a height of no less than 76 mm above the top of the finished dam or threshold shall be first lined with sheet lead or copper or with other durable and watertight materials.

All lining materials shall be pitched at a slope of 2 percent or 20 mm/m to weep holes in the subdrain of a smooth and solidly formed sub-base. All lining materials shall extend upward on the rough jambs of the shower opening to a point no less than 76 mm above the top of the finished dam or threshold and shall extend outward over the top of the rough threshold and be turned over and fastened on the outside face of both the rough threshold and the jambs.

No metallic shower sub-pans or linings may be built-up on the jobsite of not less than three (3) layers of standard grade 6.8 kg asphalt-impregnated roofing felt. The bottom layer shall be fitted to the formed sub-base and each succeeding layer thoroughly hot mopped to that below. All corners shall be carefully fitted, strengthened and watertight by folding or lapping, and each corner shall be reinforced with suitable metal webbing hot-mopped in place. All folds, laps and reinforcing webbing shall extend to at least 101 mm in all directions from the corner and all webbing shall be of approved type and mesh, producing a tensile strength of not less than 0.9 kg/mm in either direction. Non-metallic

shower sub-pans or linings may also consist of multi-layers of other approved equivalent materials suitably reinforced and carefully fitted in place on the job-site as elsewhere required in this Section.

Linings shall be properly recessed and fastened to approved backing so as not to occupy the space required for the wall covering and shall not be nailed or perforated at any point which may be less than 25.4 mm above the finished dam or threshold. An approved type sub-drain shall be installed with every shower sub-pan or lining. Each such sub-drain shall be of the type that sets flush with the sub-base and shall be equipped with a clamping ring or other device to make a tight connection between the lining and the drain. The sub-drain shall have weep holes into the waste line.

All shower-lining materials conform to approved standards acceptable to the Administrative Authority.

409.6 Floors of public shower rooms shall have a non-skid surface and shall be drained in such a manner that wastewater from one bather will not pass over areas occupied by other bathers. Gutters in public or gang shower rooms shall have rounded corners for easy cleaning and shall be sloped not less than two (2) percent toward the drains. Drains in gutters shall be spaced not more than 4.9 meters apart.

409.7 In the absence of local regulations, showers occupancies other than dwelling units served by individual water heaters shall be provided with individual shower control valves of the pressure balance or the thermostatic mixing valve type. Multiple or gang showers may be controlled by a master thermostatic mixing valve in lieu of individually controlled pressure balance or thermostatic mixing valves. Limit stops shall be provided on such valves and shall be adjusted to deliver hot water with a maximum temperature of 48.88 °C.

* *Lead and copper sub-pans or linings shall be installed from all conducting substances other than their connecting drain by 6.8 kg asphalt felt or its equivalent and no lead pan or liner shall be constructed of material weighing less than 19.6 kg/m². Thickness of copper pans or liners shall be at least Gauge No. 24 B & S (0.5 mm) thick. Joints in lead pans or liners shall be burned. Joints in copper pans or liners shall be soldered or brazed.*

Section 410 – PLUMBING FIXTURES REQUIRED

Each building shall be provided with sanitary facilities as prescribed by the National Building Code or other authorities having jurisdiction. In the absence of local requirements, a recommended list of minimum facilities for various occupancies is given on Table 4-1 of this Code.

Section 411 – WHIRLPOOL BATHTUBS

Unless otherwise listed, all whirlpool bathtubs shall comply with the following requirements:

- (a) A removable panel of sufficient dimension shall be provided for access to the pump;
- (b) The circulation pump shall be located above the crown weir of the trap,
- (c) The pump and the circulation piping shall be self-draining to minimize water retention;
- (d) Suction fittings on whirlpool bathtubs shall comply with the listed standards.

TABLE 4-1
MINIMUM PLUMBING FACILITIES

Types of Building or Occupancy ²	Water Closets (Fixtures per Person)		Urinals ¹⁰ (Fixtures per Person)	Lavatories (Fixtures per Person)		Bathtubs or Showers (Fixtures per Person)	Drinking Fountains ¹¹
Assembly Places - Theaters, Auditoriums, Convention Halls, etc. - for permanent employee use	Male 1: 1-15 2: 16-35 3: 36-55	Female ¹⁴ 1: 1-15 3: 16-35 4: 36-55	0: 1-9 1: 10-50	Male 1 per 40	Female 1 per 40		
	Over 55, add 1 fixture for each additional 40 persons		Add one (1) fixture for each additional 50 males				
Assembly Places - Theaters, Auditoriums, Convention Halls, etc. - for public use	Male 1: 1-100 2: 101-200 3: 201-400	Female ¹⁴ 3: 1-50 4: 51-100 8: 101-200 11: 201-400	1: 1-100 2: 101-200 3: 201-400 4: 401-600	Male 1: 1-200 2: 201-400 3: 401-750	Female 1: 1-200 2: 201-400 3: 401-750		1 per 75 ¹²
	Over 400, add 1 fixture for each additional 500 males and 2 for each 300 females		Over 600, add 1 fixture for each additional 500 males		Over 750, add 1 fixture for each additional 500 persons.		
Dormitories ⁹ School or Labor	Male 1 per 10	Female ¹⁴ 1 per 8	1 per 25	Male 1 per 12	Female 1 per 12	1 per 8	
	Add 1 fixture for each additional 25 males (over 10) and 1 for each additional 20 females (over 8)		Over 150, add 1 fixture for each additional 50 males		Over 150, add 1 fixture for each additional 20 males and 1 for each 15 additional females		
Dormitories for staff use	Male 1: 1-15 2: 16-35 3: 36-55	Female ¹⁴ 1: 1-15 3: 16-35 4: 36-55	1 per 50	Male 1 per 40	Female 1 per 40	1 per 8	
	Over 55, add 1 fixture for each additional 40 persons						
Dwellings ¹³ Single Dwelling Multiple Dwelling or Department	1 per dwelling 1 per dwelling or apartment unit			1 per dwelling 1 per dwelling or apartment unit		1 per dwelling 1 per dwelling or apartment unit	
Hospital Waiting Rooms	1 per room			1 per room			1 per 75 ¹²
Hospital for employee use	Male 1: 1-15 2: 16-35 3: 36-55	Female ¹⁴ 1: 1-15 2: 16-35 3: 36-55	0: 1-9 1: 10-50	Male 1 per 40	Female 1 per 40		
	Over 55, add 1 fixture for each additional 40 persons		Add 1 fixture for each additional 50 males		Over 150, add 1 fixture for each additional 20 males and 1 for each 15 additional females		
Hospitals Individual Room Ward Room	1 per person 1 per 8 patients			1 per room 1 per 10 patients		1 per room 1 per 20 patients	1 per 75 ¹²

Industrial ⁹ Warehouses Workshops, Foundries and Other establishments (for employee use)	Male 1: 1-10 2: 11-25 3: 26-50 4: 51-75 5: 76-100 Over 100, add 1 fixture for each additional 30 persons	Female 1: 1-10 2: 11-25 3: 26-50 4: 51-75 5: 76-100 Over 100, add 1 fixture for each additional 30 persons		Up to 100, 1 per 10 persons Over 100, 1 per 15 persons ^{7,8}	1 shower for each 15 persons exposed to excessive heat or to skin contamination with poisonous, infectious, or irritating material	1 per 75 ¹²
Institutional- Other than Hospitals or Penal Institutions (on each occupied floor)	Male 1 per 25	Female 1 per 20	0: 1-9 1: 10-50 Add 1 fixture for each additional 50 males	Male 1 per 10	Female 1 per 10	1 per 8
Institutional- Other than Hospitals or Penal Institution (on each occupied floor) for employee use	Male 1: 1-15 2: 16-35 3: 36-55 Over 55, add 1 fixture for each additional 40 persons	Female 1: 1-15 3: 16-35 4: 36-55	0: 1-9 1: 10-50 Add 1 fixture for each additional 50 males	Male 1 per 40	Female 1 per 40	1 per 8
Office or Public Buildings	Male 1: 1-100 2: 101-200 3: 201-400 Over 55, add 1 fixture for each additional 500 males and 2 for each 55 females	Female ¹⁴ 1: 1-200 2: 201-400 3: 401-750	1: 1-100 2: 101-200 3: 201-400 4: 401-600 Over 600, add 1 fixture for each additional 300 males	Male 1: 1-200 2: 201-400 3: 401-750 Over 750, add 1 fixture for each additional 500 persons.	Female 1: 1-200 2: 201-400 3: 401-750	1 per 75 ¹²
Office or Public Buildings – For employee use	Male 1: 1-15 2: 16-35 3: 36-55 Over 55, add 1 fixture for each additional 40 persons	Female ¹⁴ 1: 1-15 3: 16-35 4: 36-55	0: 1-9 1: 10-50 Add 1 fixture for each additional 50 males	Male 1 per 40	Female 1 per 40	
Penal Institutions – For employee use	Male 1: 1-15 2: 16-35 3: 36-55 Over 55, add 1 fixture for each additional 40 persons	Female ¹⁴ 1: 1-15 3: 16-35 4: 36-55	0: 1-9 1: 10-50 Add 1 fixture for each additional 50 males	Male 1 per 40	Female 1 per 40	1 per 75 ¹²
Penal Institution – For Prison use Cell Exercise Room		1 per cell 1 per exercise room	1 per exercise room	1 per cell 1 per exercise room		1 per cell block floor 1 per exercise room
Restaurants, Pubs and Lounges ¹¹	Male 1: 1-50 2: 51-150 3: 150-300 Over 300, add 1 fixture for each additional 200 persons	Female 1: 1-15 3: 16-35 4: 36-55	1: 1-150 Over 150, add 1 fixture for each additional 150 males	Male 1: 1-150 2: 151-200 3: 201-400 Over 400, add 1 fixture for each additional 400 persons	Female ¹⁴ 1: 1-150 2: 151-200 3: 201-400	
Schools – For staff use All schools	Male 1: 1-15 2: 16-35 3: 36-55 Over 55, ad 1 fixture for each additional 40 persons	Female 1: 1-15 3: 16-35 4: 36-55	1 per 50	Male 1 per 40	Female 1 per 40	

Schools - For student use	Male 1: 1-20 2: 21-50 Over 50, add 1 fixture for each additional 50 Persons	Female 1: 1-20 2: 21-50 Over 50, add 1 fixture for each additional 50	1 per 75	Male 1: 1-150 2: 26-50 Over 50, add 1 fixture for each additional 50 persons	Female 1: 1-25 2: 26-50 Over 50, add 1 fixture for each additional 50	1 per 75 ¹²
Elementary						1 per 75 ¹²
Secondary	Male 1 per 30	Female 1 per 25	1 per 35	Male 1 per 35	Female 1 per 35	1 per 75 ¹²
Others (Colleges, Universities, Adult Centers, etc.)	Male 1 per 40 Male 1 per 40	Female 1 per 30 Female 1 per 30	1 per 35	Male 1 per 40 Male 1 per 40	Female 1 per 30 Female 1 per 30	1 per 75 ¹²
Worship Places Educational and Activities Unit	Male 1 per 25 2: 126-250	Female ¹⁴ 1 per 75 2: 76-125 3: 126-250	1 per 25	1 per 2 water closets		1 per 75 ¹²
Worship Places Principal	Male 1 per 150	Female ¹⁴ 1 per 75	1 per 150	1 per 2 water closets		1 per 75 ¹²

Whenever urinals are provided, one (1) water closet is subtracted from the number specified on the table, except that the number of water closets in such cases shall not be reduced to less than two-thirds (2/3) of the minimum specified.

- 1 The figures shown are based upon one (1) fixture being the minimum required for the number of persons indicated or any fraction thereof.
- 2 Building categories not shown on this table shall be considered separately by the Administrative Authority.
- 3 Drinking fountains shall not be installed in toilet rooms.
- 4 Laundry trays. One (1) laundry tray or one (1) automatic washer standpipe for each dwelling unit or two (2) laundry trays or two automatic washer standpipes, or combination thereof, for each ten (10) apartments.
- 5 Kitchen sinks, one (1) for each dwelling or apartment unit.
- 6 As required by ANSI Z4.1, Sanitation in Places of Employment.
- 7 Where there is exposure to skin contamination with poisonous, infectious, or irritating materials, provide one (1) lavatory for each five- (5) persons.
- 8 Wide 609.6 mm or wash sink 457.2-mm diameter a circular basin, when provided with water outlets for such space, shall be considered equivalent to one (1) lavatory.
- 9 Laundry trays, one (1) for each fifty (50) persons. Slop sinks, one (1) for each 100 persons.
- 10 General. In applying this schedule of facilities, consideration must be given to the accessibility of the fixtures. Conformity purely on a numerical basis may not result in an installation suited to the need of the individual establishment. For example, schools should be provided with toilet facilities on each floor having classrooms. Temporary workingmen facilities, one (1) water closet and one (1) urinal for each thirty- (30) workmen.
 - a. Surrounding materials, wall ample floor space to a point 0.6 meter in front of urinal lip and 1.2 m above the floor and at least 0.6 m to each side of the urinal shall be lined with non-absorbent materials.
 - b. Trough urinals are prohibited.
- 11 A restaurant is defined as a business, which sells food to be consumed on the premises.
 - a. The number of occupants for a drive-in restaurant shall be considered as equal to the number of parking stalls.
 - b. Employee toilet facilities are not be included in the above restaurant requirements. Hand washing facilities must be available in the kitchen for employees.
- 12 When food is consumed indoors, water stations may be substituted for drinking fountains. Theaters, auditoriums, dormitories, offices, or public buildings for use by more than six (6) persons shall have one (1) drinking fountain for the first seventy-five (75) persons and one (1) additional fountain for each one hundred and fifty (150) persons thereafter.
- 13 There shall be a minimum of one (1) drinking fountain per occupied floor in schools, theaters, auditoriums, dormitories, offices or public building.
- 14 The total number of water closets for females shall be at least equal to the total number of water closets and urinals required for males.

Chapter 5

INSPECTION AND TEST

Section 501 – INSPECTION AND TESTING

- * 501.1 **Inspections**
- 501.1.1 **Scope** – all new plumbing work and such portions of existing systems as may be affected by new work or any changes shall be inspected by the Administrative Authority to insure compliance with all the requirements of this Code and to assure that the installation and construction of the plumbing system are in accordance with approved plans and specifications.
- ** 501.1.2 **Advance Notice** – it shall be the duty of the Registered and Licensed Master Plumber doing the work authorized by the permit to notify the Administrative Authority that said work is ready for inspection. Such notification shall be given not less than three (3) days before the work is inspected.
- 501.1.3 **Responsibility** – it shall be the duty of the holder of a permit to make sure that the work will stand the tests prescribed before giving notification and provide all the testing equipment and facilities required.
- 501.1.4 **Re-testing** – if the Administrative Authority finds that the work will not pass the test, necessary corrections shall be made, and the work shall then be resubmitted for another test or inspections. The Permittee shall be assessed an appropriate fee appearance.
- *** 501.1.5 **Test** – tests shall be conducted in the presence of the Administrative Authority or of his duly appointed representative.
- 501.1.6 **Corrections** – notices of corrections or violations shall be written by the Administrative Authority and hand-delivered to the permittee at the site of the work or sent by registered mail to the Permittee's authorized representative.
- 501.1.7 **Approval** – upon the satisfactory completion of plumbing work and successful final test of the installation, a certificate of approval shall be issued by the Administrative Authority to the Permittee on demand.
- **
- ** 501.1.8 **Covering or Use** – no plumbing or drainage system, building sewer, private sewer disposal system or part thereof, shall be covered, concealed or put into use until it has been inspected, tested and approved as prescribed in the Code.

* Sec. 252 NPC 1959

** Sec. 253 NPC 1959

*** Sec. 256 NPC 1959

**** Sec. 258 NPC 1959

- * 501.1.9 **Uncovering** – any drainage or plumbing system, building sewer, private sewage disposal system or part thereof, which is installed, altered or repaired is covered or concealed before the installation is inspected, tested and approved as prescribed in this Code shall be uncovered for inspection and testing after notice to uncover the work that has been issued to the responsible person at the jobsite by the Plumbing Inspector.
- 501.2 **Testing**
- 501.2.1 **Responsibility** – the equipment, material and labor necessary for inspections or tests shall be furnished by the person to whom the permit is issued or by whom inspection is requested.
- 501.2.2 **Media** – the piping of the plumbing, drainage and venting system shall be tested with water or air. The Administrative Authority requires the opening or removal of any plug or clean-out, etc., to ascertain if the testing medium has reached all parts of the system. After the plumbing fixtures have been set and their traps filled with water, they shall be submitted again for a final test.
- ** 501.2.3 **Water Test** – the water test shall be applied to the drainage and vent systems either in its entirety or in sections. If applied to the entire system, all openings in the piping shall be tightly closed, except the highest opening, and the system filled with water to the point of overflow. If the system is tested in sections, each opening shall be tightly plugged except the highest opening of the section under test, and each section shall be filled with water, but no section shall be tested with less than a 3 meter head of water. In testing successive sections at least the upper 3 meters height of the preceding section previously tested shall be tested again so that no joint or pipe in the building (except the uppermost 3 meter of the system) shall have been submitted to a test of not less than 3 meters head of water. The water shall be kept in the pipe system or in the portion under test, for at least fifteen (15) minutes before inspection starts. The system shall be tight at all joints.
- *** 501.2.4 **Air Test** – the air test shall be made by attaching an air compressor testing apparatus to any suitable opening, and after closing all other inlets and outlets to the system, air is forced into the pipe system until there is a uniform gauge pressure of 34.5 kPa or sufficient to balance a column of mercury 254 mm in height. The pressure shall be held without introduction of additional air for a period of at least fifteen (15) minutes.

* Sec. 259 NPC 1959

** Sec. 255 NPC 1959

- 501.2.5 **Building Sewer Test** – Building Sewers shall be tested by plugging the end of the building sewer at its points of connection with the public sewer or private sewage disposal system and completely filling the building sewer with water from the lowest to the highest point thereof, or by approved equivalent low pressure air test, or by such other test as may be prescribed by the Administrative Authority. The building sewer shall be watertight at all points.
- 501.2.6 **Water Piping** – upon completion of a section or of the entire hot and cold water supply systems, it shall be tested and proved tight under a water pressure not less than the working pressure under which it is to be used plus 50%. The water used for test shall be obtained from a potable source of supply. A 344.5 Kpa air pressure may be substituted for the water test. In either method of test, the piping shall withstand the test without leaking for a period of not less than fifteen (15) minutes.
- * 501.2.7 **Defective Systems** – an air test shall be used in testing the tightness condition of the drainage or plumbing system of any building premises when there is reason to believe that it has become defective. In buildings or premises condemned by the proper Administrative Authority because of an unsanitary condition of the plumbing system or part thereof, the alterations in such system shall conform to the requirements of this Code.
- 501.2.8 **Moved Structures** – all parts of the plumbing systems of any building or part thereof that are moved from one foundation to another, or from one location to another, shall be completely tested as prescribed for new work as described, except that walls or floors need not be removed during such test when other equivalent means of inspection acceptable to the plumbing authority are provided.
- 501.2.9 **Protectively Coated Pipe** – inspection and repair shall conform to Section 501 with special care to avoid damage on the outside coating of the pipe and the proper restoration of damaged portions.
- 501.2.10 **Test for Shower Receptors** – shower receptors shall be tested for water-tightness by filling with water to the level of the rough threshold. The test plug shall be so placed that both upper and under sides of the sub-pan shall be subjected to the test at the point where it is clamped to the drain.

* Sec. 260 NPC 1959

Section 502 – MAINTENANCE

The owner or his agent shall maintain the plumbing and drainage system of his premises under the jurisdiction of the plumbing authority in a sanitary and safe operating condition.

Section 503 – EXISTING CONSTRUCTION

No provision of this Code shall be deemed to require a change in any portion of a plumbing or drainage system or any other work regulated by this Code in or on existing building or lot when such work was installed and is maintained in accordance with law in effect prior to the effective date of this Code, except when any such plumbing or drainage system or other work regulated by this Code is determined by the Administrative Authority to be in fact dangerous, unsafe, insanitary, or a nuisance and a menace to life, health or property.

Section 504 – HEALTH AND SAFETY

Whenever compliance with all the provisions of this Code fails to eliminate or alleviate a nuisance, or any other dangerous or insanitary condition which involve health or safety hazards, the Owner or his agent shall install such additional plumbing and drainage facilities or shall make such repairs or alteration as may be ordered by the plumbing authority.

Chapter 6

WATER SUPPLY AND DISTRIBUTION

*** Section 601 – RUNNING WATER REQUIRED**

Each plumbing fixture shall be provided with an adequate supply of potable running water, so arranged as to flush and keep same in clean and healthful conditions without danger of backflow or cross-connection. Water closets and urinals shall be flushed by means of an approved flush tank or flushometer valve. Faucets and diverters shall be connected to the hot and cold water distribution supplies so that the hot water supply is located at left side of the combination fittings.

**** Section 602 – UNLAWFUL CONNECTIONS**

- 602.1 No installation of potable water supply piping or part thereof shall be made in such a manner that it will be possible for used, unclean, polluted or contaminated water, mixtures, or substances to enter any portion of such piping system from any tank, receptacle, equipment, or plumbing fixture by reason of back-siphonage, by suction or any other cause, either during normal use and operation thereof or when any such tank, receptacle, equipment, or plumbing fixture is flooded, or subject to pressure in excess of the operating pressure in the hot or cold water pipings.
- 602.2 No person shall make a connection or allow one to exist between pipes or conduits carrying domestic water supplied by any public or private water service system and any pipe, conduits or fixture containing or carrying water from any other source or containing or carrying water which has been used for other purposes or any piping carrying chemicals, liquids, gases or any substances unless there is provided an approved backflow prevention device.
- 602.3 No plumbing fixture, device, or construction shall be installed or maintained or shall be connected to any domestic water supply when such installation or connection may provide a possibility of polluting such water supply or may provide a cross-connection between potable water distributing system and water which become contaminated by such plumbing fixture, device, or construction, unless there is provided an indirect connection or a backflow prevention device.

* Sec. 193/194 NPC 1959

** Sec. 198/199 NPC 1959

- 4 No water piping supplied by any private water supply system shall be interconnected to an approved city water supply system or any other source of supply without the approval of the Administrative Authority, Health Department, or other agencies.

* **Section 603 – CROSS-CONNECTION CONTROL**

- 603.1 Cross-Connection control shall be provided in accordance with the provisions of this Chapter.

No person shall install any water-operated equipment or mechanism or use any water treating chemical or substances, if it is found that such equipment, mechanism, chemical or substance may cause pollution or contamination of the domestic water supply. Such equipment or mechanism may be permitted only when equipped with an approved backflow prevention device assembly.

Approval of Devices or Assemblies – before any device or assembly is installed for the prevention of backflow, the Administrative Authority shall have first approved it. Devices or assemblies shall be tested for conformity with recognized standards or other standards acceptable to the Administrative Authority. Devices or assemblies shall be tested for conformity with recognized standards or other standards acceptable to the Administrative Authority, which are consistent with the intent of this Code.

The person or persons having control of such devices or assemblies shall maintain all devices or assemblies installed in a potable water supply system for protection against backflow in good working condition. The Administrative Authority or other department having jurisdiction may inspect such devices or assemblies and, if found to be defective or inoperative, shall require the repair or replacement thereof. No device or assembly shall be removed from use or relocated, or other device or assembly substituted, without the approval of the Administrative Authority.

* Sec. 196 NPC 1959

603.2

Backflow Prevention Devices, Assemblies, and Methods

- 603.2.1 **Airgap** – the minimum airgap to provide backflow protection shall be in accordance with the Table 6-1.
- 603.2.2 **Atmospheric Vacuum Breaker (AVB)** – consists of a body, a checking member and an atmospheric opening.
- 603.2.3 **Double Check Valve Backflow Prevention Assembly (DC)** consists of two independently acting internally or externally loaded check valves, four properly located test cocks with connectors and two isolation gate valves.
- 603.2.4 **Pressure Vacuum Breaker Backflow Prevention Assembly (PVB)** – consists of a loaded air inlet valve, an internally loaded check valve, two properly located test cocks and two isolation gate valves.
- 603.2.5 **Reduced Pressure Principle Backflow Prevention Assembly (RP)** – consists of two independently acting internally loaded check valves, a differential pressure relief valve, four properly located test cocks and two isolation gate valves.

TABLE 6-1
MINIMUM AIRGAPS FOR WATER DISTRIBUTION⁴

Item No.	FIXTURES (1)	When not affected by side walls ¹ mm (2)	When affected by side walls ² mm (3)
1	Lavatories and other fixtures with effective openings ³ not greater than 13 mm in diameter	25	38
2	Sinks, laundry trays, gooseneck bath faucets and other fixtures with effective openings ³ not greater than 19 mm in diameter	38	57
3	Over rim bath fillers and other fixtures with effective openings ³ not greater than 25 mm in diameter	51	76
4	Effective openings ³ not greater than 25 mm in diameter	Two (2) times diameter of effective opening	Three (3) times diameter of effective opening

¹ Side walls, ribs or similar obstructions do not affect airgaps when spaced from the inside edge of the spout opening a distance greater than three times the diameter of the effective opening for a single wall, or a distance greater than four times the effective opening for a single wall, or a distance greater than four times the effective opening for two intersecting walls.

² Vertical walls, ribs or similar obstructions extending from the water surface to or above the horizontal plane or the spout opening other than specified in Note 1 above. The effect of three or more such vertical walls or ribs has not been determined. In such cases, the airgap shall be measured from the top of the wall.

³ The effective opening shall be the minimum cross-sectional area at the seat of the control valve or the supply pipe or tubing which feeds the device or outlet. If two or more lines supply one outlet, the effective opening shall be the sum of the cross-sectional areas of the individual supply lines or the area of the single outlet, whichever is smaller.

⁴ Airgap less than 25 mm shall only be approved as a permanent part of a listed assembly that has been tested under actual backflow conditions with vacuums of from 0 to 63.5 cm. of mercury.

TABLE 6-2
BACKFLOW ASSEMBLIES, DEVICES AND METHODS

Item No.	Description	DEGREE OF HAZARD				Function
		Pollution Low Hazard		Contamination High Hazard		
	Device Assembly or Method ¹	Back Siphonage	Back Pressure	Back Siphonage	Back Pressure	Installation ^{2,3}
1	Airgap	X		X		See table in this chapter.
2	Atmospheric Vacuum Breaker	X		X		Upright position. No valves downstream. Minimum of 150 mm or listed distance above all downstream piping and flood level rim of receptor.
3	Double Check Valve Backflow Preventer	X	X			Horizontal unless otherwise listed. Requires 30.5-cm minimum clearance at bottom for maintenance. May need platform/ladder for test and repair. Does not discharge water.
4	Pressure Vacuum Breaker	X		X		Upright position. May have valves downstream. Minimum of 30.5 cm above all downstream piping and flood level rim of receptor. May discharge water.
5	Reduced Pressure Principle Backflow Preventer	X	X	X	X	Horizontal unless otherwise listed. Require 30.5-cm minimum clearance at bottom for maintenance. May need platform/ladder for test and repair. May discharge water.
6	Spill-Proof Pressure-Type Vacuum Breaker	X		X		Upright position minute of six 152 mm or listed distance above all downstream piping and flood rim of receptor.

¹ See description of devices and assemblies in this chapter.

² Installation in pit or vault requires previous approval by the Administrative Authority.

³ Refer to general and specific requirements for installation.

⁴ Not be subjected to operating pressure for more than 12 hours in any 24 hour period.

603.3 General Requirements

- 603.3.1 All assemblies shall conform to listed standards and acceptable to the Administrative Authority having jurisdiction over the selection and installation of backflow prevention assemblies.
- 603.3.2 The premises owner or responsible person shall have the backflow prevention assembly tested by a certified backflow assembly tester at the time of installation, repair, relocation and at least on an annual schedule thereafter or more often when required by the Administrative Authority.
- 603.3.3 Access and clearance shall be provided for the required testing, maintenance and repair. Access and clearance shall require minimum of 305 mm space between the lowest portion of the assembly and the grade, floor or platform. Installations elevated more than 1.52 meters above the floor or grade shall be provided with a permanent platform capable of supporting a tester or maintenance person.
- 603.3.4 Direct connections between potable water pipings and sewer-connected wastes shall not exist under any condition with or without backflow protection. Where potable water is discharged to the drainage system, it shall be by means of an approved airgap of two (2) pipe diameters from the supply outlet and the top surface of the drainage inlet, but in no case shall the gap be less than 25 mm. Connection may be made to the inlet side of a trap provided that an approved atmospheric vacuum breaker is installed not less than 152 mm above the flood level rim of such trapped fixture, so that at no time will any such device be subjected to any back-pressure.
- 603.3.5 Backflow prevention for hot water over 43.3° C shall be a listed type assembly designed to operate at a temperature of 43.3° C or higher without rendering any portion of the assembly inoperative.
- 603.3.6 Fixtures, appliances or appurtenances with integral backflow preventers or integral airgaps manufactured as a unit shall be installed in accordance with their listed requirements.

* 603.4 **Specific Requirements**

- 603.4.1 Water Closet and Urinal Flushometer Valves shall be equipped with a listed atmospheric vacuum breaker. The vacuum breaker shall be installed at the discharge side of the flushometer valve with the critical level at least 152 mm or the distance according to its listing above the overflow rim of a water closet bowl or the highest part of a urinal.
- 603.4.2 Water Closet and Urinal Tanks shall be equipped with a listed ballcock. The ballcock shall be installed with the critical level at least 25 mm above the full opening of the overflow pipe. In cases where the ballcock has no hush tube, the bottom of the water supply inlet shall be installed 25 mm above the full opening of the overflow pipe. Water closets having the flush valve seat less than 25 mm above the flood level rim of the closet bowl shall have the ballcock installed in a separate and isolated compartment of the tank, or provided with a sheathed ballcock, or other equivalent protection.
- 603.4.3 Water Closet Flushometer Tanks shall be protected against backflow by an approved backflow prevention assembly, device or method.
- 603.4.4 Heat Exchangers, and other assemblies or methods of constructions using potable water shall be of listed construction and materials. Potable water shall be separated from the fluids or gasses by a minimum of two separate walls, with a positive, vented leak detection path. The sections in contact with potable water shall be of material and weights suitable for potable water as set forth in this Chapter.
- 603.4.5 Inlets to Tanks, Vats, Sumps, Swimming Pools and other receptors when protected by a listed atmospheric vacuum breaker shall have such atmospheric vacuum breaker installed in the discharge side of the last valve with the critical level of not less than 152 mm or in accordance with its listing above the flood level rim of such equipment, and all downstream piping. Water supply inlets not protected by atmospheric vacuum breakers shall be protected by approved airgap. Where atmospheric vacuum breakers or airgaps are not installed other backflow preventers suitable against the possible contamination or pollution may be installed in accordance with their requirements as set forth in this Chapter.
- 603.4.6 Lawn Sprinkling Systems shall be equipped with listed atmospheric vacuum breakers installed on the discharge side of each of the last shutoff valve. Where atmospheric vacuum breakers cannot be installed because of piping elevation of valves, other listed backflow preventers shall be installed in accordance with their requirements as set forth in this Chapter.
- * Sec. 200/201 NPC 1959
- 603.4.7 Potable Water Outlets with Hose Attachments other than water heater drains and clothes washer connections shall be protected by a listed non-

removable hosebibb-type backflow preventer or by a listed atmospheric vacuum breaker installed at least 152 mm above the highest point of usage and located on the discharge side of the last valve.

- 603.4.8 A listed backflow preventer installed in accordance with the requirements of this Chapter shall protect water Cooled Compressors, Degreasers or any other water-cooled equipment.

Note: *Some water-cooled equipment may produce back pressure and shall be equipped with the approved protection.*

- 603.4.9 Water Inlets to Water Supplied Aspirators shall be equipped with a listed atmospheric vacuum breaker mounted at least 152 mm above the aspirator unit or equipped with a listed backflow preventer installed in accordance with its listed requirements and this Chapter. The discharge shall drain through an airgap. When using the tailpiece of a fixture to receive the discharge of an aspirator, the airgap shall be located above the flood level rim of the fixture.

- 603.4.10 Potable Water Make Up Connections to Steam or Hot Water Boilers shall be provided with a listed backflow protection assembly.

- 603.4.11 Non-potable Water Piping. In cases where it is impractical to correct individual cross-connections in the domestic water line, the line supplying such outlets shall be considered a non-potable water line. No drinking or domestic outlets shall be connected to non-potable water line. Whenever possible, all portions of the non-potable water line shall be exposed and all exposed portions shall be properly identified in a manner satisfactory to the Administrative Authority. Each outlet on the non-potable water line, which may be used for drinking or domestic purposes, shall be posted: "**DANGER-UNSAFE WATER**".

- 603.4.12 Potable Water Supply to Carbonators shall be protected by backflow protection device as approved by the Administrative Authority and installed per the requirements of this Chapter.

- 603.4.13 Backflow Preventers shall not be located in any area containing fumes that are toxic, poisonous and corrosive

Section 604 – MATERIALS

- 604.1 Water pressure pipes shall be of brass, copper, centrifugal cast iron (CCI), B & S and F & F ends, ductile cast iron (DCI), galvanized wrought iron, galvanized steel, or other approved PE & PVC water pressure pipe manufactured to recognized standards may be used for cold water distribution systems. CPVC water pipe and tubing may be used for hot and cold-water distribution systems within a building. All materials used in the water supply system, except valves and similar devices, shall be of a like material, except where otherwise approved by the Administrative Authority.
- 604.2 Cast iron fittings up to and including 51 mm in size, when used in connection with potable water piping shall be galvanized.
- 604.3 All small-sized malleable iron water fittings shall be galvanized.
- 604.4 Pipings and tubings, which were previously used for any purpose other than for potable water systems shall not be used.
- 604.5 Approved plastic materials may be used in water service piping, provided that where metal water service piping is used for electrical grounding purpose and replacement pipings therefore shall be of like materials.
- Exception:** *Where a grounding system, acceptable to the Administrative Authority is installed, inspected, and approved, metallic pipe may be replaced with non-metallic pipe.*
- 604.6 Solder shall conform to the requirements of Subsection 1302.4
- 604.7 Water pipes and fittings with a lead content that exceed eight (8) percent shall be prohibited and not used in potable piping systems.

Section 605 – VALVES

- 605.1 Valves up to and including 51 mm in size shall be brass or other approved materials. Sizes over 51 mm may have cast iron or brass bodies. Each gate valve shall be a fullway type with working parts of non-corrosive materials.
- 605.2 A fullway gate valve controlling all outlets shall be installed on the discharge side of each water meter and on each unmetered water supply. Water supply piping supplying more than one building in any premise shall be equipped with a separate fullway gate valve to each building, so arranged that the water supply can be turned on or off to any individual or separate building; provided however, that supply piping to a single family residence

and building accessory thereto, may be controlled by one gate valve. Such shutoff gate valves shall be accessible at all times. A fullway gate valve shall be installed on the discharge piping from water supply tanks at or near the tank. A fullway gate valve shall be installed on the cold water supply pipe to each water heater near the water heater. A fullway gate valve shall be installed for each apartment or dwelling occupied by more than one family. In addition to the main supply shutoff valve for each apartment, individual shutoff gate valves shall be provided for each fixture.

- 605.3 A valve used to control two (2) or more openings shall be a fullway gate valve.
- 605.4 Control gate valves shall be installed before each water-supplied appliance slip joint, supply pipings for non-metallic fixture and appliance.
- 605.5 All required shutoff or control valves shall be accessible.
- 605.6 A single control gate valve shall be installed in a water supply line ahead of any automatic metering valve which supplies a battery of fixtures.

Section 606 – GRAVITY SUPPLY TANKS

- 606.1 Elevated or gravity storage tank for potable water supply shall be tightly covered to keep out unauthorized persons, dirt and vermin. The covers of gravity tanks shall be vented with a return-bend vent pipe having an area not less than the area of the down-feed riser pipe, and the vent shall be screened with a fine corrosion-resistant screen with openings not less than 14 nor more than 18 mess per 25 mm.
- 606.2 Potable water inlets to gravity tanks shall be controlled by a float valve, float switch or electrode-type water level control to prevent the tank from overflowing.
- 606.3 Gravity tanks shall be provided with a valved drain pipe and an overflow pipe screened as described in Subsection 606.1.

Section 607 - WATER PRESSURE, PRESSURE REGULATORS, AND PRESSURE RELIEF VALVES

- 607.1 **Inadequate Water Pressure** – Whenever the water pressure in the main or other source of supply will not provide a water pressure of at least 103 kPa, after allowing friction and other pressure losses, a hydro-pneumatic pressure tank or an elevated tank and booster pump will provide said 103 kPa pressure.
- 607.2 **Excessive Water Pressure** – Where the local water pressure is in excess of 551 kPa, an approved-type pressure regulator preceded by an adequately sized strainer shall be installed to reduce the pressure on the building side of the regulator to the required supply pressure. Approved regulators with integral bypasses are acceptable. Each such regulator and strainer shall be accessibly located and have the strainer readily accessible for cleaning without removing the regulator or strainer body or disconnecting the supply piping. All pipe size determinations shall be based on eighty (80) percent of the reduced pressure when using Table 6-6.
- 607.3 Any water distributing system provided with a pressure regulating device or check valve at its source or any water system containing storage water heating equipment shall be provided with an approved, listed, adequately sized pressure relief valve with approved drain, except for listed non-storage instantaneous heaters having an inside diameter of not more than 76 mm.

In addition to the required pressure relief valve, an approved and listed expansion tank or other device designed for intermittent operation for thermal expansion control shall be installed whenever the building supply pressure is greater than the required relief valve pressure setting or when any device is installed that prevents pressure relief through the building water supply. The tank or device shall be sized in accordance with the manufacturer's recommendation.
- 607.4 Each pressure relief valve shall be an approved automatic type with drain, and each such relief valve shall be set at a pressure of not more than 1033 kPa
- 607.5 Relief valves located inside a building shall be provided with drain, adequately-sized and not smaller than the relief valve outlet or galvanized steel, hard drawn copper piping and fittings, CPVC or PB with fittings which will not reduce the internal bore of the pipe or tubing (straight lengths as opposed to coils) and shall extend from the valve to the outside of the building with the end of the pipe not more than 0.6m nor less than 152 mm above the ground and pointing downward. Such drains may terminate at

other approved locations. No part of such drainpipe shall be trapped and the terminal end of the drainpipe shall not be threaded nor capped.

- 607.6 Any water-heating device connected to a separate elevated or pressure-type storage tank and having valves between said heater and tank shall be provided with an approved water pressure relief valve.
- 607.7 Nothing contained herein shall prevent the use of an approved combination temperature and pressure relief valve (CT & PRV). Each such approved CT & PRV shall be installed on the water heating device in an approved location based on its listing requirements and the manufacturer's instructions. Each such CT & PRV shall be provided with a drain as required in Subsection 607.5

Section 608 – INSTALLATION, INSPECTION, AND TESTING

- 608.1 **Installation** – all water piping shall be adequately supported to the satisfaction of the Administrative Authority. Burred ends shall be reamed to the full bore of the pipe or tube. Changes in direction shall be made by the appropriate use of fittings, except that changes in direction in copper tubing may be made with bends provided that the same are made with proper bending equipment which does not deform or create a loss in cross-sectional area of the tubing. Provisions shall be made for expansion in hot water pipings. All pipings, equipment, appurtenances and devices shall be installed in a workmanlike manner in conformity with the provisions and intents of this Code. All water service yard piping shall be at least 0.3 m below the finish ground level.
- 608.2 Water pipes shall not be run or laid in the same trench as building sewer or storm drainage pipings constructed of clay or materials not approved for use within the building unless both of the following conditions are met:
 - 608.2.1 The bottom of the wafer pipe at all points, shall be at least 0.3 m above the top of the sewer or drain line;
 - 608.2.2 The water pipe shall be placed on a solid shelf excavated at one side of the common trench with a minimum clear horizontal distance between the sides of at least 0.3-m from the side of sewer or drain line and the water line, and
 - 608.2.3 Water pipes crossing sewer or drainage piping constructed of clay or materials, not approved for use within a building, shall be laid a minimum of 0.3 m above the sewer or drainpipe.

- 608.3 Water piping installed within a building and in or under a concrete floor slab resting on the ground shall be installed in accordance with the following requirements:
- 608.3.1 Ferrous piping shall have an outside protective coating of an approved materials, machine applied and conforming to recognized standards. Field bitumastic coating and wrapping shall provide equivalent protection and application is restricted to those short pipe lengths at points of connection with fittings necessarily stripped for threading and jointing. Zinc coating (galvanized) shall not be deemed adequate outside protection for ferrous piping or fittings. Approved non-ferrous pipings such as plastic tubes and pipes need not be wrapped for rustproofing.
- 608.3.2 Copper tubing shall be installed without joints where possible. Where joints are permitted, they shall be brazed and fittings shall be wrought copper. Copper tubing shall be fully externally protected with bitumastic coating and fiberglass wrapping and installed inside a split rigid casing whenever installed underground.

Note: For the purpose of this section, "within the building" shall mean within the fixed limits of the building foundation.

- 608.3.3 Plastic pipings shall be installed in accordance with applicable sections found elsewhere in this Code.
- 608.4 **Inspection** – no water supply system or portion thereof, shall be covered or concealed until it has been first inspected, tested and approved.
- 608.5 **Testing** – water piping shall be tested and approved as provided in Section 501.
- 608.6 Unions – unions shall be installed in the water supply piping within 0.3 meter away from regulating equipment, water heater, conditioning tank and similar equipment which require removal for servicing or replacement.

Section 609 – SIZE OF POTABLE WATER PIPING

- 609.1 The size of the water meter and the immediate piping from the meter or from other source of unmetered water supply to the risers, fixture supply branches, fixture connections, outlets or other uses shall be based on the total water demand and shall be determined according to the methods and procedures outlined in this section.

- 609.2 Whenever a water filter, water softener or similar water treating device, backflow prevention device or similar devices are installed in a water supply line, the pressure loss through such devices must be included in the pressure loss calculations of the system and the water supply pipe and meter shall be adequately sized to provide for such pressure losses.
- 609.2.1 No water filter, water softener, backflow prevention device or similar devices regulated by this Code shall be installed in any potable water supply piping when the diameter of the inlet and/or outlet of any such device or its connecting pipings are less than the diameter of the water supply distribution piping, or when the installation of such devices produces excessive pressure drop in the water supply piping system.
- 609.2.2 All such devices shall be of types approved by the Administrative Authority and tested for flow ratings and pressure losses by an approved laboratory or recognized testing agency against standards consistent with this Chapter. The maximum rated flow and the pressure loss shall be stamped legibly on the device or on a metal label, permanently attached with the device, and shall be in the following form:

TABLE 6-3
MAXIMUM PRESSURE DROP

Flow, Liters per second	Pressure Drop
0.32	- (kPa)
0.63	- (kPa)
0.95	- (kPa)

Note: *The final figure in the pressure drop column shall be based on the minimum rated flow or capacity of the device.*

- 609.3 The quantity of water required to be supplied to every plumbing fixture shall be represented by "Fixture Units" (FU), as shown in Table 6-5.
- 609.4 Where the maximum length of supply piping is 61 meters or less, each water piping system of fifty fixture units (FU) or less shall be sized in accordance with the values set forth in Table 6-6. Other systems of more than (50) fixture units and within range of Table 6-6 may be sized from that table or by method set forth in Appendix A (Recommended rules for sizing the water supply system).

- 609.5 Except where the type of the pipe used and the water characteristics are such that no decrease in capacity due to length of service (age of system) may be expected, all friction loss data shall be obtained from the "Fairly Rough" or "Rough" charts in Appendix A of this Code. Friction or pressure losses in water meter, valve and fittings shall be obtained from the same sources. Pressure loses through water treating equipment. Back flow prevention devices, or other flow restricting devices shall be computed as required in subsection 609.2 of this section.
- 609.6 For proposed water piping installation sized using Table 6-6 the following conditions shall be determined:
- 609.6.1 Total number of fixture units (F.U.) determined from the Table of Equivalent Fixture Units (Table 6-5) for the fixtures to be installed;
- 609.6.2 Developed length of supply pipe from water meter to the most remote outlet;
- 609.6.3 Difference in elevation between the water meter or other source of water supply and the highest fixture or outlet to be installed;
- 609.6.4 Water Pressure in the street main or other source of water supply in the locality where the installation is to be made; and
- 609.6.5 In localities where there is a fluctuation of water pressure in the main throughout the day, the water piping system shall be designed on the basis of the minimum pressure available.
- 609.7 **Size of Water Meter and Building Supply Pipe Using Table 6-6.** Knowing the available pressure at the water meter or other source of supply, and after subtracting 9.79 kPa* per m of difference in elevation between such source of supply and highest water supply outlet in the building or on the premises, use the "Pressure Range" group within which this pressure will fall. Select the "Length" column which is equal to or longer than the required length. Follow down the column to a fixture unit value equal to or greater than the total number of fixture units required by the installation. Having located the proper fixture unit value for the required length, sizes of meter and building supply pipe will be found in the two left-hand columns.
- No building water service pipe shall be less than 19 mm in diameter.

* 1 PSI = 6.895 Kilo Pascal (Kpa)

609.8 Size of Branches. The number of fixture units handled by a branch shall determine the size of that branch, following the methods outlined in subsection 609.7 of this section.

609.9 Sizing for Flushometer Valves. Branches and mains serving water closets or similar flushometer valves may be sized from Table 6-6 when the values in Table 6-4 are assigned to each flushometer valve beginning with the most remote valve in each branch.

Any system using flushometer valves may be sized also by the procedures set forth in Appendix A (Recommended rules for sizing the water supply system). Piping supplying a flushometer valve shall not be less in size than the valve inlet.

TABLE 6-4

Flushometer Fixture Units for Water Sizing Using Table

Number of Flushometer Valves	Fixture Categories	
	Fixture Units Assigned for Water Closets and Similar Fixtures	Fixture Units Assigned for Urinals and Similar Fixtures
1	40	20
2	70	35
3	90	45
4	105	53
5 or more	115 plus 10 for each additional fixture in excess of 5	58 plus 5 for each additional fixture in excess of 5

609.10 Sizing Systems for Flushometer Tanks. The size of branches and mains serving flushometer tanks shall be consistent with the sizing procedures for flush tank water closets.

609.11 Sizing systems With Hot Water Piping. In sizing the water piping system having a total demand of 50 F.U. or less, the greatest developed length of the cold water supply piping may be used (from Table 6-6) and the length of the hot water piping ignored when the hot water piping friction loss is compensated for by the following method:

609.11.1 Compute the total hot water fixture unit demand, using those values given Table 6-5 for the combined hot and cold water use;

609.11.2 Assign the total demand computed as required in 609.11.1 above, as the fixture unit demand at the hot water heater inlet,

- 609.11.3 Starting at the most remote outlet on the cold water piping and working back toward the water meter, compute the pipe sizing for the system from the column originally selected in Table 6-6 using the fixture unit valves given in Table 6-5 and adding in the fixture unit demand of the hot water heater supply inlet as computed in 609.11.1 above, at the point where it occurs. The final size of the cold water branch or main need not exceed the originally established size of the building supply.
- 609.12 Except as provided in Subsection 609.11, water piping systems may be designed by taking the total length of the supply piping from the source of cold water supply through the water heater, to the most remote hot water outlet and assessing flow values of seventy-five (75) percent of the combined hot and cold water demand as given in Table 6-5 to the piping supplying either hot or cold water to those fixtures served by both. Piping serving water heaters plus all required cold water demand, shall be sized to deliver the required hot water demand, but in no case need the piping be larger in size than that required by Table 6-6 for the total building supply.
- 609.13 Exceptions: The provisions of this Section relative to size of water piping need not apply to the following:
- 609.13.1 *Water supply piping systems designed in accordance with recognized engineering procedures acceptable to the Administrative Authority;*
- 609.13.2 *Alteration of or minor additions to existing installations, provided the Administrative Authority finds that there will be a reasonably adequate supply of water to all fixtures;*
- 609.13.3 *Replacement of existing fixtures or appliances;*
- 609.13.4 *Piping which is part of fixture equipment;*
- 609.13.5 *Unusual conditions where, in the judgement of the Administrative Authority, a reasonably adequate supply of water is provided;*
- 609.13.6 *Non-potable water lines as defined in subsection 603.4.11 of Section 603.*
- 609.13.7 *The size and materials used for irrigation water piping installed outside of any building or structure and separated from the potable water supply system by means of an approved airgap or backflow prevention device is not regulated by this Code. The main potable water supply piping supplying both the potable water demand and the irrigation systems shall be adequately sized as required elsewhere in this Chapter to deliver the full connected demand of both systems.*

Section 610 – WATER CONSERVATION

- 610.1 The maximum discharge flow rates for plumbing fixture fittings shall be in accordance with applicable standards listed in Chapter 14.
- 610.2 Flush volumes for low consumption and water saver water closets and urinals shall be in accordance with applicable standards listed in Chapter 14.

TABLE 6-5
EQUIVALENT WATER SUPPLY FIXTURE UNITS
 (Includes Combined Hot and Cold Water Demands)

Item No.	Fixture	Number of Water Supply Fixture Units (WSFU)	
		Private Use	Public Use
1	Bar Sink	1	2
2	Bathtub (With or Without Shower Over)	2	4
3	Bidet	2	4
4	Dental Unit or Cuspidor	-	1
5	Drinking Fountain (each faucet)	1	2
6	Hose Bibb or sill cock (standard type)	3	5
7	Laundry Tub or Clothes Washer (each pair of faucets)	2	4
8	Lavatory	1	2
9	Lavatory (dental)	1	1
10	Lawn sprinkles (standard type, each head)	1	1
11	Mobile home (each)	6	6
12	Shower (each head)	2	4
13	Sink (bar)	1	2
14	Sink (flushing rim clinic)	-	10
15	Sink or dishwasher	2	4
16	Sink (wash-up circular spray)	-	4
17	Sink (wash-up, each set of faucets)	-	2
18	Urinal (flush tank)	-	3
19	Urinal (pedestal or similar type)	-	10
20	Urinal (stall)	-	5
21	Urinal (wall)	-	5
22	Water Closet (flush tank)	3	5
23	Water Closet (economical flush)	2.5	4
24	Water Closet (flushometer-tank)	3	5
25	Water Closet *(flushometer valve)	*	*
	Water supply outlets for items not listed above shall be computed at their maximum demand but in case less than:		
	a - 9.5mm	1	2
	b - 13mm	2	4
	c - 19mm	3	6
	d - 25mm	6	10

- * See Subsection 609.9 of Section 609 for method of sizing flushometer valve installations using Table 6-6

**MIXTURE UNIT TABLE FOR DETERMINING
WATER PIPE AND METER SIZES**

Item No.	Meter and street service	Building supply and branches	PRESSURE RANGE - 207 to 310 KPa (30 to 45 psi)												Maximum Allowable Length in meters		
			12	18	24	30	46	61	76	91	122	152	183	213	244	274	305
1	19	13	6	5	4	3*	2*	1*	1*	1*	0*	0*	0*	0*	0*	0*	0*
2	19	19	16	16	14*	12*	9*	6*	5*	5*	4*	4*	3*	2*	2*	2*	1*
3	19	25	29	25	23	21	17	15	13	12	10	8	6	6	6	6	6
4	25	25	36	31	27	25	20	17	15	13	12	10	8	9	6	6	6
5	25	32	54	47	42	38	32	28	25	23	29	17	14	12	12	11	11
6	38	32	78	68	57	48	38	32	28	25	21	18	15	12	12	11	11
7	38	38	150	124	105	91	70	57	49	45	36	31	26	23	21	20	20
8	51	38	151	129	129	110	80	64	53	46	38	32	27	23	21	20	20
9	38	51	220	205	190	176	155	138	127	120	104	85	70	61	57	54	51
10	51	51	370	327	292	265	217	185	164	147	125	96	70	61	57	54	51
11	51	64	445	418	390	370	330	300	280	265	240	220	198	175	158	143	133

1 psi = 6.895 KPa

TABLE 6-6.2

Item No.	Meter and street service (mm)	Building supply and branches (mm)	Maximum Allowable Length in Feet (meters)													
			(12)	(18)	(24)	(30)	(46)	(61)	(76)	(91)	(122)	(152)	(183)	(213)	(244)	(274)
1	19	13	7	7	6	5	4	3*	2*	2*	1*	1*	0*	0*	0*	0*
2	19	19	20	20	19	17	14*	11*	9*	8*	6*	5*	4*	4*	3*	3*
3	19	25	39	39	36	33	28	23	21	19	17	14	12	10	9	8
4	25	25	39	39	36	30	25	23	20	18	15	12	10	9	8	8
5	25	52	78	78	76	67	52	44	39	36	30	27	24	20	19	17
6	38	32	78	78	78	66	52	44	39	33	29	24	20	19	17	16
7	38	38	151	151	151	151	128	105	90	78	62	52	42	38	35	30
8	51	58	151	151	151	151	150	117	98	84	67	55	42	38	35	30
9	38	51	370	370	340	318	272	240	220	198	170	150	135	123	110	102
10	51	51	370	370	370	370	368	318	280	250	205	165	142	123	110	102
11	51	64	654	640	610	580	535	500	470	440	400	365	335	315	285	267

1 psi = 6.895 Kpa

TABLE 6-6.3

Item No.	Meter and street service (mm)	Building supply and branches (mm)	PRESSURE RANGE - Over 413 KPa (Over 60 psi)												Maximum Allowable Length in Feet (meters)	
			(12)	(13)	(24)	(30)	(46)	(61)	(76)	(91)	(122)	(152)	(183)	(213)	(244)	(274)
1	19	13	7	7	6	5	4	3*	3*	2*	1*	1*	1*	1*	1*	0*
2	19	19	20	20	20	17	13*	11*	10*	8*	7*	6*	5*	4*	4*	4*
3	19	25	39	39	39	35	30	27	24	21	17	14	13	12	12	11
4	25	25	39	39	39	38	32	29	26	22	18	14	13	12	12	11
5	25	32	78	78	78	74	62	53	47	39	31	26	25	23	22	21
6	38	32	78	78	78	78	74	65	54	43	34	26	25	23	22	21
7	38	38	151	151	151	151	130	113	88	73	51	51	46	43	40	40
8	51	38	151	151	151	151	151	142	122	98	82	64	51	46	43	40
9	38	51	370	370	370	370	360	335	305	282	244	212	187	172	153	141
10	51	51	370	370	370	370	370	370	340	340	288	245	204	172	153	141
11	51	64	654	654	654	654	650	610	570	510	460	430	404	380	356	329

1 psi = 6.895 KPa

Section 611 - Piping Installed in Fire Resistive Construction

Where piping is installed and penetrates required fire resistive construction, the fire resistant integrity of the construction shall be that required by the Administrative Authority, or when not established by the building Code, by qualified testing methods approved by the Administrative Authority Approval shall be obtained prior to installing any such piping.

Section 612 - Hangers and Supports Abrasion

Hangers and straps shall not compress, distort, cut or abrade the piping and shall allow free movement of pipe. Pipe exposed to damage by sharp surfaces shall be protected.

Section 613 - Support

Support all piping at intervals of not more than four (4) feet (1219 mm), at end of branches, and at change of direction or elevation. Supports shall allow free movement, but shall restrict upward movement of lateral runs to avoid reverse grade. Vertical piping shall be supported at each story or floor level. Alignment of vertical piping shall be maintained between floors with the use of a mid-story guide. Support trap arms in excess of three (3) feet (914 mm) in length as close as possible to the trap. Closet rings shall be tightly fastened with corrosive resistant fasteners up to the floor with top surface one-quarter (1/4) inch (6.4 mm) above finish floor.

Section 614 - Thrust Blocking

In lines with rubber gasketed joints, thrust blocks shall be installed at all:

- 614.1 Changes in direction, as at tees and bends;
- 614.2 Changes in size, as at reducers,
- 614.3 Stops, as at dead ends; and
- 614.4 Valves, where thrusts may be expected.

Thrust block sizes shall be based on the maximum line pressure, pipe size and kind of soil. Refer to Useful Tables and Charts.

Chapter 7

*** EXCRETA DRAINAGE SYSTEM**

Section 701 – MATERIALS

- 701.1 Excreta Drainage pipings shall be cast iron, ductile iron, galvanized steel, galvanized wrought iron, lead, copper, brass, Series 1000 PVC DWV, extra-strength vitrified clay pipe or other approved materials having smooth and uniform bore except that:
- 701.1.1 No galvanized wrought iron or galvanized steel pipe shall be used underground and shall be kept at least 152 mm above ground.
- 701.1.2 ABS and PVC DWV piping installations shall be used in high-rise buildings, provided that its use shall be the discretion of the Master Plumber/Designer and also with the full consent of the owner.
- 701.1.3 No vitrified clay pipes or fittings for building drain or sewer shall be used above ground or whenever piping is pressurized by a pump or ejector. They shall be kept at least 0.3 meter below finish ground level.
- 701.2 Drainage fittings shall be of cast iron, malleable iron, lead, brass, copper, ABS, PVC, vitrified clay, or other approved materials having a smooth interior waterway of the same diameter as the piping served and all such fittings shall be compatible with the type of pipe used.
- 701.2.1 Fittings on screwed pipe joints shall be of the recessed drainage type. Burred ends shall be reamed to the full bore of the pipe.
- 701.2.2 The threads of drainage fittings shall be tapped to allow two (2) percent or 21 mm/m grade.

Section 702 – FIXTURE UNIT EQUIVALENT

- 702.1 The Fixture Unit (F.U.) rating of plumbing fixtures shown on Table 7-2 shall be based on the size of the trap required, and the fixture unit equivalent of fixtures and devices not shown in Table 7-2 shall be based on the rated discharge capacity in liters per second in accordance with the Table 7-3

Maximum trap loadings for sizes up to 102 mm are as follows:

* Sec. 242 243 244 245 NPC 1959

TABLE 7-1
MAXIMUM TRAP LOADING

Item No.	Pipe Size	Fixture Unit F.U.
1	32	1
2	38	3
3	51	4
4	76	6
5	102	8

Exception: On self-service laundries.

Section 703 – SIZE OF DRAINAGE PIPING

- 703.1 The minimum sizes of vertical and/or horizontal drainage pipings shall be determined from the total of all fixture units connected thereto, and additional, in the case of vertical drainage pipes, in accordance with their height or length.
- 703.2 Table 7-5 shows the maximum number of fixture units allowed on any vertical or horizontal drainage pipe, building drain or building sewer of a given size, the maximum number of fixture units allowed on any branch interval of a given size; the maximum length meters of any vertical drainage pipe of a given size.

TABLE 7-2

* MINIMUM TRAP DIAMETERS AND DRAINAGE FIXTURE UNIT VALUES

Item No.	Fixture	Trap & Trap Arm Size mm	Drainage Fixture Unit (DFU)
1	Bathtubs	38	2
2	Bidets	38	2
3	Clotheswashers*	51	2
4	Dental units or cuspidors	32	1
5	Drinking fountains	31	1
6	Floor drains	51	2
7	Interceptors* for grease, oil, etc.	51	3
8	Interceptors* for sand, auto wash, etc.	76	6
9	Laundry tubs	38	2
10	Mobile home park traps (one for each trailer)	76	6
11	Receptors* (floor sinks), indirect waste receptors for refrigerators, coffee urns, water station, etc.	38	1
12	Receptors*, indirect waste receptors for commercial sinks, dishwashers, air washers, etc.	51	3
13	Shower, single stall	51	2
14	Shower*, gang (one unit per head)	51	
15	Sinks, and/or dishwashers (residential) 51 mm min. waste	38	2
16	Sinks, bar, commercial 51 mm min. waste	38	2
17	Sinks, bar, private 38 mm min. waste	38	1
18	Sinks, commercial or industrial, schools, etc., including dishwashers, wash up sinks, and wash fountains 50.8 mm waste	38	3
19	Sink, flushing rim, clinic	76	6
20	Sink, service	51	3
21	Urinal, pedestal, trap arm only	76	6
22	Urinal, stall, separate trap	51	2
23	Urinal, wall-mounted, integral trap, trap arm only	51	3
24	Urinal, wall-mounted, blowout, integral trap, trap arm only	76	6
25	Urinal, wall-mounted, washdown or siphon jet, integral trap, trap arm only	51	2
26	Urinal, wall-mounted, washout, separate trap 50.8 mm min. waste	38	2
27	Wash basins, in sets	38	2
28	Wash basin (lavatory) single	32	1
29	Water closet,* private installation	76	4
30	Water closet, public installation	76	6

* Sec. 180 / 214 NPC 1959

Note: The size and discharge rating of each indirect waste receptor and each interceptor shall be based on the total rated discharge capacity of all fixtures, equipment, or appliances discharging therein to in accordance with Table 7-3.

Drainage piping serving batteries of appliances capable of producing continuous flows shall be adequately sized to provide for peak loads. Clothes washers in groups of three (3) or more shall be rated at six (6) fixture units each for the common horizontal and vertical waste pipe sizing.

Water closets shall be computed as six (6) fixture units when determining septic tank size based on Appendix B of this Code.

Trap sizes shall not be increased to a point where the fixture discharge may be inadequate to maintain their self-scouring properties.

TABLE 7-3

DISCHARGE CAPACITY

*Liters per second / F.U.
For Intermittent Flow Only*

Item No.	Liters per second (L/s)	Fixture Unit (F.U.)
1	Up to 0.47	1 Unit
2	0.50 to 0.95	2 Units
3	1 to 1.89	4 Units
4	1.95 to 3.15	6 Units

Capacity over 3.15 l/s shall be determined by the Administrative Authority.

For a continuous flow into a drainage system, such as from sump pump or ejector, air conditioning equipment or similar devices, two (2) fixture units shall be allowed for every 0.063 L/s of flow.

$$1 \text{ gpm} = 0.063 \text{ Lps}$$

Section 704 – FIXTURE CONNECTIONS (EXCRETA DRAINAGE)

- 704.1 Drainage piping shall be provided with approved inlet fittings for fixture connections, correctly located according to the size and type of fixture proposed to be connected.
- 704.2 Two fixtures set back-to-back, or side-by-side, within the distance allowed between a trap and its vent, may be served by a single vertical drainage pipe, provided that each fixture wastes separately into an approved double fitting, such as double sanitary tee or double wye and 1/8 bend having inlet openings at the same level.

Section 705 – CHANGES IN DIRECTION OF EXCRETA DRAINAGE FLOW

- 705.1 Changes in direction of drainage piping shall be made by the appropriate use of approved fittings and shall be of the angles presented by a 22 ½° or 1/16 bend, 45° or 1/8 bend, and 60° or 1/6 bend or other approved fittings of equivalent sweeps.
- 705.2 Horizontal drainage branch lines, connecting with a vertical stack, shall enter through 45 or 60 degree wye branches, combination wye and 1/8 bend branches, sanitary tee or sanitary tapped tee branches or other approved fittings of equivalent sweeps. No fitting having more than one inlet at the same level shall be used unless such fitting is constructed so the discharge from one inlet cannot readily enter into the other inlet.. Double sanitary tees may be used when the barrel of the fitting is at least two (2) pipe sizes larger than the largest inlet, (pipe sizes recognized for this purpose are 51, 64, 76, 89, 102, 114, 127 & 152 mm diameters, etc.
- 705.3 Horizontal drainage lines connecting with other horizontal drainage line shall enter through forty-five degree wye branches, combination wye and one-eighth bend branches or other approved fittings of equivalent sweep.
- 705.4 Vertical drainage lines connecting with horizontal drainage lines shall enter through forty-five (45) degree branches or other approved fittings of equivalent sweep. Sixty (60) degree branches or offsets may be used only when installed in a true vertical position.

Section 706 – CLEANOUTS

- 706.1** Each horizontal drainage pipe shall be provided with a cleanout at its upper terminal and each run of piping which is more than 15 meters in total developed length shall be provided with a cleanout and at every 15 meter length or a fraction thereof,

TABLE 7-4**CLEANOUTS**

Size of Pipe (mm)	Size of Cleanout (mm)	Threads per 25.4 mm
38	38	11-1/2
51	38	11-1/2
64	64	8
76	64	8
102 & larger	89	8

Exceptions:

- 706.1.1** Cleanouts may be omitted on a horizontal drain line less than 1.5 meter in length unless such line is serving sinks or urinals.
- 706.1.2** Cleanouts may be omitted on short horizontal drainage pipe installed at a slope of seventy two (72) degrees or less from the vertical line (or an angle 1/5 bend), and
- 706.1.3** An approved type of two-way cleanout fitting, installed inside the building wall near the connection between the building drain and building sewer or installed outside of a building at the lower end of the building drain and extended to grade, may be substituted for an upper terminal cleanout.
- 706.2** An additional cleanout shall be provided on a horizontal line with an aggregate offset angle of direction exceeding one hundred and thirty-five (135) degrees.
- 706.3** Each cleanout shall be installed so it opens in the direction of flow to allow cleaning of the soil or waste line or at right angles thereto and, except in the case of wye branch and end-of-line cleanouts, shall be installed vertically above the flow line of the pipe

- 706.4 Each cleanout extension shall be considered as drainage piping and each ninety (90) degrees cleanout extension shall be extended from a wye type fitting or other approved fitting of equivalent sweep.
- 706.5 Each cleanout for an interceptor shall be outside of such interceptor.
- 706.6 Each cleanout, unless installed under an approved cover plate, shall be above grade, readily accessible, and so located to serve the purpose it is intended. Cleanouts located under cover plates shall be installed to provide the clearances and accessibility required by this Section.
- 706.7 Each cleanout in piping 51 mm or less in size shall be installed so that there is a clearance of not less than 305 mm in front of the cleanout. Cleanouts in piping larger than 51 mm shall have a clearance of not less than 0.45 m in front of the cleanout. Cleanouts in underfloor piping shall be extended to or above the finished floor or shall be extended outside the building when there is less than 0.45 meter vertical and 0.75 meter horizontal clearance from the means of access to such cleanout. No underfloor cleanout in any residential occupancy shall be located more than 6.1 meters from an access door, trap door or crawl hole.
- 706.8 Cleanout fittings shall be not less in size than those given in Table 7-6.
- 706.9 Cleanouts shall be provided for pressure drainage systems.
- 706.10 Countersunk cleanout plugs shall be installed where raised heads may cause hazard to passing personnel or vehicles.
- 706.11 When a hubless blind plug is used for a required cleanout, the complete coupling and plug shall be accessible for removal or replacement.

Section 707 – GRADE OF HORIZONTAL EXCRETA DRAINAGE PIPING

Horizontal drainage piping shall be run in practical alignment and at a uniform slope of not less than 2% or 20 mm/m towards the point of disposal, provided that, where it is impractical due to the depth of the street sewer or to adverse structural features or to some irregular arrangements of affected building or structure to obtain a slope of 2 percent or any such pipe or piping 102 mm or larger in diameter may have a slope of not less than one 1 percent or 10 mm/m when first approved by the Administrative Authority.

Section 708 – GRAVITY DRAINAGE REQUIRED

Where practicable, all plumbing fixtures shall be drained into the public sewer or private sewage disposal system by gravity.

Section 709 – DRAINAGE OF FIXTURES LOCATED BELOW THE UPSTREAM MANHOLE OR BELOW THE MAIN SEWER LEVEL.

- 709.1 Drainage piping serving fixtures which have flood level rims located below the elevation of the nearby upstream manhole invert of the public sewer serving such drainage piping shall be protected from backflow of sewage by installing an approved-type backwater valve. Fixture installed above such elevation shall not discharge through the backwater valve.
- 709.2 Drainage piping serving fixtures located below the crown level of the main sewer shall discharge into an approved watertight sump or receiving tank, the sewage or other liquid wastes shall then be lifted and discharged into the building drain or building sewer by approved ejector, pump or other equally efficient mechanical device.
- 709.1 The minimum size of any pump discharge or any discharge pipe from a sump having a water closet connected thereto shall not be less than 50.8 mm diameter.
- 709.2 The vertical discharge line from such ejector, pump or other mechanical device to a horizontal drainline shall be provided with an accessible backwater or swing check valve and gate valve close to the connection with the horizontal line. The method of connection shall be at the top of the horizontal line through a wye branch fitting. The gate valve shall be located at the discharge side of the backwater or check valve.
- 709.3 Building drain or building sewer receiving discharge from any pump or ejector shall be adequately sized to prevent overloading. Two (2) fixture units shall be allowed for each 0.063 L/s of flow or each GPM flow.
- 709.4 Backwater valves, gate valves, motors, compressors, air tanks and other mechanical devices required by this Section shall be located where they will be accessible for inspection and repair at all times and, when not exposed, shall be enclosed in a water-tight masonry pit fitted with an adequately-sized removable cover.

- 709.5 The drainage and venting systems in connection with fixtures, sumps, receiving tanks and mechanical waste lifting devices, shall be installed under the same requirements as provided in this Code for gravity systems.
- 709.6 Sumps and receiving tanks shall be watertight and shall be constructed of concrete, metal or other approved materials. If constructed of poured concrete, the walls and bottom shall be adequately reinforced and designed according to recognized acceptable standards. Metal sumps or tanks shall be of such thickness to serve their intended purpose and shall be properly coated internally and externally to resist corrosion.
- 709.7 All such sumps and receiving tanks shall be automatically discharged and, when rated as "public use" occupancy, shall be provided with dual pumps or ejectors arranged to function independently in case of overload or mechanical failure. The invert of the lowest inlet to the tank shall have a minimum distance of 51 mm above the high water or "starting" level of the pumping operation.
- 709.8 Sumps and receiving tanks shall be provided with substantial covers having a bolt and gasket type manhole or equivalent opening to permit access for inspection, repairs and cleaning. The top shall be provided with a vent pipe which shall extend separately through the roof, or when permitted, may be combined with other vent pipes. Such vent shall be large enough to maintain atmospheric pressure within the sump under all normal operating conditions and, in no case, shall be less in size than that required by Table 7-5 for the number and type of fixtures discharging into the sump, nor less than 51 mm in diameter. When the foregoing requirements are met and the vent, after leaving the sump, is combined with vents from fixtures discharging into the sump, the size of the combined vent need not exceed the required size for the total number of fixtures discharging into the sump. No vent from an air-operating sewage ejector shall combine with other vents.
- 709.9 Air tanks shall be proportioned to be of equal cubical capacity to the ejector connected therewith where there shall be maintained an air pressure of not less than 3 kg for each meter of height the sewage is raised. No water operated ejectors shall be permitted.
- 709.10 When subsoil drainage system is installed, it shall be initially discharged into an approved receiving tank and discharged in a manner satisfactory to the Administrative Authority.

Section 710 – SUDS RELIEF

Fixture outlets shall not be connected to the horizontal excreta drainage piping system within 2.4 meter of any vertical to horizontal change of direction of a stack containing suds-producing fixtures. Bathtubs, laundries, washing machine standpipes, kitchen sinks and dishwashers shall be considered suds-producing fixtures.

Exceptions

- (a) Single family residences.
- (b) Stacks receiving the discharge from less than (3) stories of plumbing fixtures

TABLE 7-5
Maximum Fixture Unit Loading and Maximum Length
of Excreta Drainage and Vent Piping

Item No.	Size of Pipe mm	32	38	51	65	76	102	127	152	203	254	305
A.	Maximum Fixture Unit of Drainage Piping:											
1	Vertical	1	2 ²	16 ³	32 ³	48 ⁴	256	600	1380	3600	5600	8400
2	Horizontal	1	2	8 ³	14 ³	35 ⁴	216 ³	428 ³	720 ³	2640 ³	4680 ³	8200
B.	Maximum Length of Vertical Piping Meter	14	20	26	45	65	91	119	155	228		
	Horizontal (Unlimited)											
C.	Vent Piping											
	Horizontal and Vertical											
4	Maximum Fixture Unit	1	8 ³	24	48	84	256	600	1380	3600		
5	Maximum Lengths meter	14	18	37	55	65	91	119	155	228		

(See Note)

1. Excluding trap arm.
2. Except sinks, urinals and dishwashers.
3. Except 6 fixture unit traps or water closets.
4. Only four (4) water closets or 6 fixture unit traps are allowed on any vertical pipe or stack; and not to exceed three (3) water closets or six (6) fixture unit traps on any horizontal branch or drain.
5. Based on two (2) percent or 20.9 mm/m slope. For one (1) percent or 10.4 mm/m slope, multiply horizontal fixture units by a factor of 0.8.

Note: The diameter of an individual vent shall not be less than 32 mm nor less in size than one-half (1/2) the diameter of the drain to which it is connected. Fixture unit load values for drainage and vent piping shall be computed from Tables 7-2 and 7-3 not to exceed one third (1/3) of the total permitted length of any vent may be installed in a horizontal position. When vents are increased one (1) pipe size for their entire length, the maximum length limitations specified in this table do not apply.

TABLE 7-6
CLEANOUTS (metric)

Item No.	Size of Pipe (mm)	Size of Cleanout (mm)	Threads per 25.4 mm length
1	38	38	11-1/2
2	51	38	11-1/2
3	64	64	8
4	76	64	8
5	102 & larger	89	8

Chapter 8

INDIRECT WASTE PIPING, WET-VENTED SYSTEMS AND SPECIAL WASTES

Section 801 – INDIRECT WASTE CONDITIONS

801.1 No evaporative cooler, air washer or similar air conditioning equipment shall have any drain pipe in connection therewith, directly connected to any soil, waste and vent pipe. Such equipment shall be drained by means of indirect waste pipes as defined in Chapter 2 of this Code, and all wastes drained by them shall discharge through an airbreak into an open floor sink or other approved type receptor properly connected to the drainage system.

801.2 No cold storage room, refrigerator, cooling counter, compartment, receptacle, appurtenance or device used for the storage or holding of food or drink and no dishwashing or culinary sink in any food preparation room used for soaking, washing or preparing ready-to-serve food shall have any drain in connection therewith directly connected to any soil, waste or vent pipe. Such equipment or fixtures shall be drained by means of indirect waste pipes, as defined in Chapter 2 of this Code; and all wastes drained by them shall discharge through an airgap into an open floor sink or other approved type receptor properly connected to the drainage system.

The foregoing does not apply to walk-in refrigerators or combination walk-in and reach-in refrigerators used for storage and sales of products packaged in bottles, cartons or containers.

Cooling and air-conditioning equipment may be separated by an airbreak, but all food equipment shall be separated from the drainage system by a full airgap.

801.3 The airgap for drainage shall be not less than 25 mm between the plumbing fixture, appliance or appurtenance outlet and the rim of the floor sink or receptor.

Section 802 – APPROVALS

No plumbing fixtures served by indirect waste pipes or receiving discharge therefrom shall be installed until first approved by the Administrative Authority.

Section 803 – INDIRECT WASTE PIPING

Except as hereinafter provided, the size and installation of indirect waste piping shall be in accordance with other Sections of this Code applicable to drainage and vent piping. No vent from indirect waste piping shall combine with any excreta connected vent, but shall extend separately to the outside air. Indirect waste pipes exceeding 1.5 meters but less than 4.6 meters length shall be directly trapped, but such traps need not be vented.

Indirect waste pipes less than 4.6 meters in length need not be larger in diameter than the drain outlet or tailpiece of the fixture, appliance or equipment served, but in no case less than 13 mm in diameter. Angles and changes of direction in such indirect waste pipes shall be provided with cleanouts to permit flushing and cleaning.

Section 804 – INDIRECT WASTE RECEPTORS

- 804.1 All plumbing fixtures or other receptors receiving the discharge of indirect waste pipes shall be approved for the use proposed and of such shape and capacity to prevent splashing or flooding and shall be located where readily accessible for inspection and cleaning. No standpipe receptor for any clotheswasher shall extend more than 0.8 meter nor less than 0.45 m above its trap. No trap for any clotheswasher standpipe receptor shall be installed below the floor, but shall be roughed no less than 15 cm and not more than 45 cm above the floor. No indirect waste receptor shall be installed in any toilet room, closet, cupboard or storeroom nor in any other portion of a building not for general use by the occupants thereof, except that standpipes for clotheswasher may be installed in toilet and bathroom areas when the clotheswasher is installed in the same room.
- 804.2 Where water service connections are installed for clotheswasher, an approved method of waste disposal shall be provided.
- 804.3 Every indirect waste interceptor receiving discharge containing particles that clogs the receptor drain shall have a readily removable beehive strainer.

Section 805 -- PRESSURE DRAINAGE CONNECTION

Indirect waste connections shall be provided for drains, overflows or relief vents from the water supply system; and no piping or equipment carrying wastes or producing wastes, or other discharges under pressure shall be directly connected to any part of the drainage system.

The foregoing shall not apply to any approved sump pump or to any approved pressure-wasting plumbing fixture or device when the Administrative Authority has satisfied himself that the drainage system is adequately sized to accommodate the anticipated discharge thereof.

Section 806 – STERILE EQUIPMENT

Appliances, devices or apparatus such as stills, sterilizers and similar equipment requiring water and waste and used for sterile materials shall be drained through an airgap.

Section 807 – APPLIANCES

- 807.1 Appliances, devices, equipment or other apparatus not regularly classified as plumbing fixtures equipped with pumps, drips or drainage outlets may be drained by indirect waste pipes discharging into an approved-type open receptor.
- 807.2 When the condensate waste from air conditioning coils is discharged by direct connection to a lavatory tailpiece or to an approved accessible inlet or a bathtub overflow, the connection shall be located in the area controlled by the same person controlling the air conditioned space.
- 807.3 When undiluted condensate waste from a fuel burning condensing appliance is discharged into the drainage system, the material in the drainage system shall be cast iron, galvanized iron, plastic or other materials approved for this use.

Exceptions:

- 807.3.1 *When the above condensate is discharged to an exposed fixture tailpiece and trap, such tailpiece and trap may be brass.*
- 807.3.2 *Any materials approved in Section 701 may be used when, in the opinion of the Administrative Authority, condensate waste from a fuel burning condensing appliance is diluted either before or after discharge into the drainage system.*
- 807.4 No domestic dishwashing machine shall be directly connected to a drainage system of food waste disposer without the use of an approved dishwasher airgap fitting on the discharge side of the dishwashing machine. Listed airgaps shall be installed with the flood level (FL) marking at or above the flood level of the sink or drainboard, whichever is higher.

Section 808 – COOLING WATER

When permitted by the Department having jurisdiction, clean running water used exclusively as a cooling medium in an appliance, device or apparatus, may discharge into the drainage system through the inlet side of a fixture trap in the event that a suitable fixture is not available to receive such discharge. Such trap connection shall be by means of a pipe connected to the inlet side of an approved fixture trap, the upper end terminating in a funnel shaped receptacle set adjacent, and not less than 152 mm above the overflow rim of the fixture.

Section 809 – DRINKING FOUNTAINS

Drinking fountains may be installed with indirect wastes.

**Section 810 – STEAM AND HOT WATER DRAINAGE
CONDENSERS AND SUMPS**

- 810.1 No steam pipe shall be directly connected to any part of a plumbing or drainage system, nor shall any water having a temperature above 60°C be discharged under pressure directly into any part of a drainage system. Pipes from boilers shall discharge by means of indirect waste piping as determined by Administrative Authority or the boiler manufacturer's recommendations. Such pipes may be indirectly connected by discharging into an open or closed condenser or intercepting sump of approved type that will prevent the entrance of steam or such water under pressure into the drainage system. All closed condensers or sums shall be provided with a vent taken off from the top and extended separately, full size above the roof. All condensers and sums shall be properly trapped at the outlet with a deep seal trap extending to within 152 mm of the bottom of the tank. The top of the deep seal trap shall have a 19 mm diameter opening located at the highest point of the trap to serve as a siphon breaker. Outlets shall be taken off from the side in a manner to allow a water line to be maintained that permanently occupies not less than one-half ($\frac{1}{2}$) the capacity of the condenser or sum. All inlets shall enter above the water line. Wearing plates or baffles shall be installed in the tank to protect the shell. The sizes of the blowoff line inlets, the water outlets and the vent shall be as shown in Table 8-1. The contents of condensers receiving steam or hot water under pressure must pass first through an open sum before entering the drainage system.
- 810.2 Sumps, condensers or intercepting tanks constructed of concrete shall have walls and bottom not less than 102 mm thickness, and the inside shall be cement plastered not less than 13 mm in thickness. Condensers constructed of metal shall be not less than No. 12 U.S. Standard gauge (2.77 mm thickness) and all such metal condensers shall be protected from external corrosion by an approved bituminous coating.
- 810.3 Sumps and condensers shall be provided with suitable means of access for cleaning and shall contain a volume of not less than twice the volume of water removed from the boiler or boilers connected thereto when the normal water level of such boiler or boilers is reduced not less than 102 mm.

TABLE 8-1**PIPE CONNECTIONS IN BLOWOFF CONDENSERS AND SUMPS**

No.	Boiler Blowoff, mm	Water Outlet, mm	Size of Vent, mm
1	19	19	51
2	25.4	25.4	64
3	32	32	76
4	38	38	102
5	51	51	127
6	64	64	152

* To be used only with boilers of 9.29 m^2 of heating surface or less.

Section 811 – CHEMICAL WASTES

811.1 Chemical or industrial liquid wastes likely to damage or increase maintenance costs on the excreta sewer system, detrimentally affect sewage treatment or contaminate surface or subsurface waters, shall be pretreated to render them innocuous prior to their discharge into a drainage system. Detailed plans and specifications of pretreatment facilities shall be required by the Administrative Authority.

Piping conveying industrial, chemical or process wastes from their point of origin to sewer-connected pretreatment facilities shall be of such material and design to adequately perform its intended function to the satisfaction of the Administrative Authority. Drainage discharge piping from pretreatment facilities or interceptors shall conform to standard drainage installation procedure.

811.2 Each waste pipe receiving or intended to receive the discharge of any fixture where acid or corrosive chemical is placed and each vent pipe connected thereto, shall be constructed of chemical-resistant glass-lined pipe, high silicon iron pipe, lead pipe not less than 3.2 mm wall thickness, an approved type of ceramic glazed or unglazed vitrified clay or other approved corrosion resistant materials.

- 811.3 All jointing materials shall be of approved type and quality.
- 811.4 Whenever practicable, all piping shall be readily accessible and installed with the maximum of clearance from other services.
- 811.5 The owner shall make and keep a permanent record of the location of all pipings and venting carrying chemical waste.
- 811.6 No chemical vent shall be connected or intersect vents for other services.
- 811.7 No chemical wastes shall be discharged into the ground, local sewer or other disposal means without approval of the local Administrative Authority.
- 811.8 The provisions of this Section relative to materials and methods of construction, need not apply to minor installations such as small photographic or x-ray dark rooms or small research or control laboratories where small amounts of adequately water-diluted chemicals are discharged.

Section 812 – VERTICAL WET VENTING

- 812.1 Wet venting is limited to vertical drainage piping receiving the discharge from the trap arm of one (1) and two (2) fixture unit. Fixtures that also serves as a vent for not to exceed four (4) fixtures. All wet-vented fixtures shall be on the same floor level, provided further, that fixtures with a continuous vent discharge into a wet vent shall be on the same level as the wet-vented fixtures.
- 812.2 The vertical piping between any two (2) consecutive inlet levels shall be considered a wet-vented section. Each wet-vented section shall be a minimum of one (1) pipe size larger than the required minimum waste pipe size of the upper fixture or shall be one (1) pipe size larger than the required minimum pipe size for the sum of the fixture units served by such wet-vented section, whichever is larger, but in no case less than 51 mm in diameter.
- 812.3 Common vent sizing shall be the sum of the fixture units served but in no case smaller than the minimum vent pipe size required for any fixture served, or by Section 904.

Section 813 – SPECIAL VENTING FOR ISLAND FIXTURES

Traps for island sinks and similar equipment shall be roughed-in above the floor and may be vented by extending the vent as high as possible, but not less than the drainboard height and then returning it downward and connecting it to the horizontal sink drain immediately downstream from the vertical fixture drain. The returned vent shall be connected to the horizontal drain through a wye-branch fitting and shall, in addition, be provided with a foot vent taken off the vertical fixture vent by means of a wye-branch immediately below the floor and thence extending the vent line to the nearest partition and then through the roof to the open air or may be connected to other vents at a point not less than 152 mm above the flood level rim of the fixtures served. Drainage fittings shall be used on all parts of the vent below the floor level and such a vent line shall have a minimum slope of 2 percent or 21 mm/m back toward the drain where it is connected shall be maintained. The return bend used under the drainboard shall be a one (1) piece fitting or an assembly of a forty-five (45) degree elbows. Pipe sizing shall be as elsewhere required in this Code. The island sink drain, upstream of the returned vent, shall serve no other fixtures. Accessible cleanouts shall be installed in the vertical portions of the foot vent and the waste at floor level.

*** Section 814 – COMBINATION WASTE AND VENT SYSTEMS**

- 814.1 Combination waste and vent systems (CW & VS) shall be permitted only where structural conditions preclude the installation of conventional systems as otherwise prescribed by this Code.
- 814.2 Plans and specifications for each CW & VS shall first be approved by the Administrative Authority before any portion of any such system is installed.
- 814.3 Each CW & VS as defined in Sub-Section 104.11 of Section 104, shall be provided with a vent or vents adequate to assure free circulation of air. Any branch more than 4.6 meter m length shall be separately vented in an approved manner. The minimum area of any vent installed in a CW & VS shall be at least one-half (1/2) the inside cross sectional area of the drain pipe served. The vent connection shall be downstream of the uppermost fixture.

* Sec. 250 / 251 NPC 1959

- 814.4 Each waste pipe and each trap in any CW & VS shall be at least two (2) pipe sizes larger than the sizes required by Chapter 7 of this Code and at least two (2) pipe sizes larger than any fixture tailpiece or connection.
- 814.5 Unless specifically required or permitted by the Administrative Authority, no vertical waste pipe shall be used in any CW & VS, except the tailpiece or connection between the outlet of a plumbing fixture and the trap therefore. Such tailpiece or connections shall be as short as possible and in no case shall exceed 0.6 meter long.
- 814.6 Cleanouts may not be required on any wet-vented branch serving a single trap when the fixture tailpiece or connection is not less than 51 mm in diameter and provide ready access for cleaning through the trap. An accessible cleanout shall be installed in each vent for the CW & VS.

Section 815 – DIRECT WASTE TO GROUND

“Sacrarium” waste of holy water and washwater at church altar services must not be discharged into the sanitary drainage system but disposed off directly into the ground.

Section 816 - Clear Water Wastes

Water lifts, expansion tanks, cooling jackets, sprinkler systems, drip or overflow pans or similar devices which discharge clear wastewater into the building drainage system shall discharge through an indirect waste by means of an air gap.

Section 817 - Swimming Pools

Pipes carrying wastewater from swimming or wading pools, including pool drainage and backwash from filters, and water from promenade drains which serve walks shall be installed as an indirect waste. Where a pump is used to discharge waste pool water to the drainage system, the pump discharge shall be installed as an indirect waste.

Section 818 - Refrigeration Wastes

The indirect waste lines carrying refrigeration waste shall not be smaller than shown in the following pipe size schedule:

32 mm – 1 inlet serving not more than 2.8 m³ of refrigeration space;
51 mm – 4 to 12 m³; 32 mm inlets or the equivalent refrigeration space;
76 mm – 13 to 36 m³; 32 mm inlets or the equivalent refrigeration space.

Section 819 - Air-Conditioning Equipment

If discharged into the drainage system any evaporative cooler, airwasher, or similar air-conditioning equipment shall be drained by means of an indirect waste pipe.

§19.1

Size

Air-conditioning condensate waste pipes shall be independent of any drainage and waste system and shall not be smaller than shown in Table 8-2.

TABLE 8-2

Item No.	Equipment Capacity in Tons of Refrigeration (kW)	Minimum Condensate Pipe Diameter in (mm)
1.	Through 3 (Through 10.56)	19.1
2.	Through 20 (Through 70.33)	25.4
3.	Through 90 (Through 316.48)	32
4.	Through 125 (Through 439.6)	38
5.	Through 250 (Through 879.2)	51

The size of condensate waste pipes may be for one unit or a combination of units, or as recommended by the manufacturer. The capacity of waste pipes assumes 10.5 mm/m or one percent slope, with the pipe running three-quarter (3/4) full under the following conditions:

Outside Air - 20%		Room Air - 80%	
DB	WB	DB	WB
90°F	73°F	75°F	62.5°F

Condensate drain sizing for other slopes or other conditions shall be approved by the Administrative Authority.

Air conditioning waste pipes shall be constructed of materials specified in Chapter 7.

819.2 Point of Discharge

Air-conditioning condensate waste pipes shall connect indirectly to the drainage system through an airgap or airbreak to:

- A. A properly trapped receptor; or
- B. Other points of discharge acceptable to the Administrative Authority including dry wells, leach pits, the tailpiece of plumbing fixtures, etc.

Chapter 9

VENTS AND VENTING

Section 901 – VENTS REQUIRED

Each plumbing fixture trap, except as otherwise provided in this Code, shall be protected against siphonage and back-pressure. Air circulation shall be assured throughout all parts of the excreta drainage system by means of vent pipes installed in accordance with the requirements of this Chapter and as required in this Code.

Section 902 – VENTS NOT REQUIRED

- 902.1 Where permitted by the Administrative Authority, vent piping may be omitted on an interceptor when such interceptor acts as primary settling tank and discharges through a horizontal indirect waste pipe into a secondary interceptor. The second interceptor shall be properly tapped and vented.
- 902.2 Traps serving sinks which are part of the equipment of bars, soda fountains and counters need not be vented when the location and construction of such bars, soda fountains and counters is to make it impossible to do so. When such conditions exist, said sink shall discharge by means of approved indirect waste pipe into a floor sink or other approved type receptor.

Section 903 – MATERIALS

- 903.1 Vent pipes shall be cast iron, ductile cast iron, galvanized steel, galvanized wrought iron, lead, copper, brass, Schedule 40, ABS, DWV, Series 1000, PVC, DWV or other approved materials having a smooth and uniform bore except that:
 - 903.1.1 No galvanized wrought iron or galvanized steel pipe shall be used underground and shall be kept at least 15 cm. above ground.
 - 903.1.2 Horizontal and vertical vent lines and vent stacks shall be copper, cast iron, galvanized wrought iron or polyvinyl chloride pipes.

- 903.2 Vent fittings shall be cast iron, galvanized malleable iron or galvanized steel, lead, copper, brass, ABS, PVC, or other approved materials, except that no galvanized malleable iron or galvanized steel fittings shall be buried underground but shall be kept at least 152 mm above finish ground level.
- 903.3 Changes in direction of vent piping shall be made by the appropriate use of approved fittings and no such pipe shall be strained or bent. Burred ends shall be reamed to the full bore of the pipe.

* Section 904 – SIZE OF VENTS

- 904.1 The sizes of vent piping shall be determined from its length and the total number of fixture units connected thereto, as set forth in Table 7-5 of this Code. In addition, the drainage piping of each building and each connections to a public sewer or a private sewage disposal system shall be vented by means of one or more vent pipes, the aggregate cross-sectional area of which shall not be less than that of the largest required building sewer, as determined from Table 7-5, page 88.
- Exception: When connected to a common building sewer, the drainage piping of two (2) or more buildings located on the same lot and under one ownership may be vented by means of piping sized in accordance with Table 7-5 provided the aggregate cross-sectional area of all the vents is not less than that of the largest required common building sewer.*

- 904.2 The length of horizontal portion of a vent may exceed one-third (1/3) of the total length of vertical and horizontal portions as limited by Table 7-5 provided the vent is increased to one pipe size larger for its entire length.

** Section 905 – VENT PIPE GRADES AND CONNECTIONS

- 905.1 All horizontal vent and branch vent pipes shall be free from drops or sags and each such vent shall be graded and connected to drip back by gravity to the drainage pipe it serves.
- 905.2 Where vents connect to a horizontal drainage pipe, such vent pipe connection shall have its invert taken off above the drainage centerline of such pipe downstream of the trap being served.

* Sec. 224 NPC 1959

** Sec. 225 NPC 1959

- 905.3 Unless prohibited by structural conditions, each vent shall rise vertically to a point not less than 152 mm above the highest flood level rim of the fixtures served before offsetting horizontally to join the vent stack or stack vent and the bottom connection shall be installed with approved drainage fittings and installed with proper grade to the horizontal drain.
- 905.4 All vent pipes shall extend undiminished in size above the roof or shall be reconnected with the soil or waste stack vent of proper size at a point below the roof, the vent through the roof (VSTR) shall be increased one (1) pipe size above the reconnection point of stack vent and horizontal vent.
- 905.5 The vent pipe opening from a soil or waste pipe, except for water closets and similar fixtures, shall not be below the weir of the trap.
- 905.6 Two (2) fixtures may be served by a common vertical vent pipe when each such fixture wastes separately into an approved double branch fitting having inlet openings at the same level.

Section 906 – VENT TERMINATION

- 906.1 Each vent pipe or stack through roof (SVTR) shall extend its flashing all around and the stack vent shall terminate vertically not less than 15 cm above the roof nor less than 0.3 meter from any vertical surface nearby.
- 906.2 Each vent opening shall terminate not less than three (3) meters from, or at least 0.9 meter above any openable window, door opening, air intake or vent shaft; nor less than 0.9 meter away from any lot line, alley and street boundary lines.
- 906.3 Vent pipes shall be extended separately or combined, of full required size, not less than 15 cm above the roof or fire wall. Flagpoling of vents is prohibited except where the roof is used for purposes other than weather protection.
- 906.4 Vertical vent pipes for outdoor installations shall extend to at least 3 meter distant from any part of the roof that is used for other purposes and shall extend not less than 2.1 meter above such roof and shall be securely stayed.
- 906.5 Joints at the roof around stack vent pipes shall be made watertight by the use of approved flashing material and installation.

Section 907 – VENT STACKS AND RELIEF VENTS

- 907.1 Each soil or waste stack which extends ten (10) or more stories above the building drain shall be served by a parallel vent stack which shall extend undiminished in size from its upper terminal at the roof and connect to the soil or waste stack at ground level and at every fifth floor levels with a "yoke vent" at a point below the horizontal soil or waste branch connection to the stack and at the nearby vent stack above the same floor to provide a relief vent. The size of yoke vent shall be not less in diameter than either the soil stack or the vent stack, whichever is smaller.
- 907.2 The yoke vent connection with the vent stack shall be placed not less than 1.0 meter above the floor level, and the yoke vent connection with the drainage stack shall be by means of a wye branch fitting placed below the fixture branch serving that floor.

Section 908 - Vents Not Required

- 908.1 Where permitted by the Administrative Authority, vent piping may be omitted on an interceptor when such interceptor acts as a primary settling tank and discharges through a horizontal indirect waste pipe into a secondary interceptor. The second interceptor shall be properly trapped and vented.
- 908.2 Traps serving sinks which are part of the equipment of bars, soda fountains, and counters, need not be vented when the location and construction of such bars, soda fountains, and counters is to make it impossible to do so. When such conditions exist, said sinks shall discharge by means of approved indirect waste pipes into a floor sink or other approved type receptor.

Section 909 - Materials

- 909.1 Vent pipes shall be cast iron, galvanized steel, galvanized wrought iron, lead, copper, brass, Schedule 40 ABS DWV, Series 1000 PVC DWV or other approved materials having a smooth and uniform bore except that:
- 909.1.1 No galvanized wrought iron or galvanized steel pipe shall be used underground and shall be kept at least 152 mm above ground.

Section 910 - Size of Vents

- 910.1 The size of vent piping shall be determined from its length and the total number of fixture units connected thereto, as set forth in Table 7-5. The diameter of an individual vent shall not be less than one and one-fourth (1-1/4) inches (32 mm) nor less than one-half (1/2) the diameter of the drain to which it is connected. In addition, the drainage piping of each building and each connection to a public sewer or a private sewage disposal system shall be vented by means of one or more vent pipes, the aggregate cross-sectional area of which shall not be less than that of the largest required building sewer, as determined from Table 7-5, page 88.
- 910.2 No more than one-third (1/3) of the total permitted length, per Table 7-5 of any minimum sized vent shall be installed in a horizontal position.

Chapter 10

TRAPS AND INTERCEPTORS

Section 1001 – TRAPS REQUIRED

- 1001.1 Each plumbing fixture, excepting those having integral traps, shall be separately trapped by an approved-type waterseal trap. Not more than one trap shall be permitted on a trap arm.
- 1001.2 It is provided, however, that one trap may serve a set of not more than three (3) single compartment sinks or laundry tubs of the same depth or three (3) lavatories immediately adjacent to each other and in the same room if the waste outlets are not more than 0.75 meter apart and the trap is centrally located when three (3) compartments are installed. The depth requirement may be waived if approved-type pump discharge the fixtures or appliances.
- 1001.3 No food waste disposal unit shall be installed on any set of restaurant, commercial or industrial sinks served by a single trap, each such food waste disposal unit shall be connected to a separate trap. Each domestic clotheswasher and each laundry tub shall be connected to a separate and independent trap; except that a trap serving a laundry tub may also receive the waste from a clotheswasher set adjacent thereto. No clotheswasher or laundry tub shall be connected to any trap of a kitchen sink.
- 1001.4 The vertical distance between a fixture outlet and the trap weir shall be as short as practicable, but in no case shall the tailpiece from any fixture exceed 0.6 meter in length.

Section 1002 – TRAPS PROTECTED BY VENT PIPES

- 1002.1 Each plumbing fixture trap, except as otherwise provided in this Code, shall be protected against siphonage and back-pressure by a properly placed vent pipe. Air circulation shall be assured throughout all parts of the drainage system by means of a vent pipe system installed in accordance with the requirements of this Code.

1002.2 Each fixture trap shall have a protecting vent so located that the developed length of the trap arm from the trap weir to the inner edge of the vent shall be within the distance given in Table 10-1, but in no case less than two times the diameter of the trap arm.

1002.3 A trap arm may change direction without the use of a cleanout when such change of direction does not exceed ninety (90) degrees.

Exception: *For trap arms 76 mm in diameter and larger, the change of direction not exceeding 22 ½° no cleanout is required and for change of direction greater than 22 ½° a cleanout is required at the bend.*

1002.4 The vent pipe opening from a soil or waste pipe, except for water closets and similar fixtures, shall not be below the weir of the trap.

TABLE 10-1

**Horizontal Distance of Trap Arms
(Except for water closets and similar fixtures)**

Trap Arm Diameter Mm	Distance To Vent m
32	0.76
38	1.07
51	1.52
76	1.83
102 & larger	3.05

Slope 2% or 20 mm/meter

* *The developed length between the trap of a water closet or similar fixture measured from the top of closet ring (closet flange) to inner edge of vent shall not exceed 1.8 meters.*

*** Section 1003 – TRAPS DESCRIBED**

- 1003.1 Each trap, except one for an interceptor or similar device shall be self-cleaning. Traps for bathtubs, showers, lavatories, sinks, laundry tubs, floor drains, urinals, drinking fountains, dental units and similar fixtures shall be of standard designs and weights and shall be of ABS, cast brass, cast iron, lead, PVC, or other approved materials. An exposed and readily accessible drawn brass tubing trap, not less than Gauge 17 B&S (1.1 mm), may be used on fixtures discharging domestic sewage but shall exclude urine. Each trap shall have the manufacturer's name stamped legibly on the metal of the trap and each tubing trap shall have the gauge of the tubing in addition to the manufacturer's name. Every trap shall have a smooth and uniform interior waterway.
- 1003.2 No more than one approved slip joint fitting may be used on the outlet side of a trap, and no tubing trap shall be installed without a listed tubing trap adapter.
- 1003.3 The nominal size of a trap for a given fixture shall be sufficient to drain the fixture rapidly, but in no case, less than that given in Table 7-2. The trap shall be the same size as the trap arm to which it is connected.

**** Section 1004 – TRAPS PROHIBITED**

No form of trap which depends for its seal upon the action of movable parts or concealed interior partitions shall be used. "S", Bell and Crown-vented traps are prohibited. No fixture shall be double trapped. Drum traps may be installed only when permitted by the Administrative Authority for special condition. No drum trap shall be installed without a vent.

***** Section 1005 – TRAP SEALS**

Each fixture trap shall have a water seal of not less than 51 mm and not more than 102 mm deep except where a deeper seal is found necessary by the Administrative Authority for special conditions. Traps shall be set erect and true with respect to their water seals.

* Sec. 184 NPC 1959

** Sec. 181 NPC 1959

*** Sec. 183 NPC 1959

* Section 1006 – FLOOR DRAIN TRAPS

Floor drain shall connect into a trap so constructed that it can be readily cleaned and of a size to serve efficiently the purpose for which it is intended. The drain inlet shall be so located that it is all times in full view. When subject to reverse flow of sewage or liquid waste, such drains shall be equipped with an approved backwater valve.

Section 1007 – TRAP SEAL PROTECTION

Floor drain or similar traps directly connected to the drainage system and subject to infrequent use shall be provided with an approved automatic means of maintaining their water seals, except where not deemed necessary for safety or sanitation purposes by the Administrative Authority. When automatic trap priming devices are installed, they shall be accessible for maintenance and provided by an accessible shut-off valve.

Section 1008 – INDUSTRIAL INTERCEPTORS (CLARIFIERS) AND SEPARATORS

- 1008.1 When Required** – interceptors or clarifiers (including grease, oil and sand interceptors, etc.) shall be provided when, in the judgment of the Administrative Authority, they are necessary for the proper handling of liquid wastes containing grease, flammable wastes, sand, solids, acid or alkaline substances, or other ingredients harmful to the building drainage system, the public or private sewer and sewage disposal system.
- 1008.2 Approval** – the size, type, and location of each interceptor (clarifier) or separator shall be approved by the Administrative Authority, in accordance with its standards. Except where otherwise specifically permitted, no wastes other than those requiring treatment or separation shall be discharged into any interceptor or clarifier.
- 1008.3 Design** – interceptors or clarifiers for sand and similar heavy solids shall be so designed and located as to be readily accessible for cleaning and shall have a water seal of not less than 152 mm deep.
- 1008.4 Relief Vent** – interceptors or clarifiers shall be so designed that they will not become air bound if closed covers are used. Each interceptor (clarifier) shall be properly vented.
- 1008.5 Location** – each interceptor or clarifier shall be readily accessible for servicing and maintaining in working and operating conditions. The use of ladders or the removal of bulky equipment in order to service interceptors or clarifiers shall constitute a violation of accessibility. Location of all interceptors (clarifiers) shall be shown on the building plan submitted for approval by the Administrative Authority.

* Sec. 191 NPC 1959

Section 1009 – SLAUGHTER HOUSES, PACKING ESTABLISHMENTS, ETC.

Every fish, fowl and animal slaughter house or establishments and every fish, fowl and meat packing or curing establishments, or any other establishment from which considerable amounts of grease, hairs, feathers, etc., are likely to be discharged with the wastewater into the plumbing system, sewer system, or private sewage disposal system shall be connected to and shall drain or discharge through a screening device and thence into a grease interceptor (clarifier) of an approved design for the proper disposal of effluents.

Section 1010 – MINIMUM REQUIREMENTS FOR AUTO WASH RACK

Every private or public washrake and/or floor or slab used for cleaning machinery or machine parts shall be adequately protected against storm or surface water and shall drain or discharge into an interceptor (clarifier) of an approved design for this use to separate the oil and grease before the effluent reach the public stream.

*** Section 1011 – GREASE TRAPS**

- 1011.1 When, in the judgment of the Administrative Authority, waste pretreatment is required, an approved-type grease trap complying with the provisions of this sections shall be installed in the wasteline leading from sinks, drains and other fixtures or equipment in establishments such as restaurants, cafes, lunch counters, cafeterias, bars and clubs, hotel, hospital, sanitarium, factory or school kitchens, or other establishments where grease may be introduced into the drainage or sewer system in quantities that can effect line stoppage or hinder sewage treatment or private sewage disposal. A grease trap is not required for individual dwelling units or for any private living quarters.
- 1011.2 No individual grease trap shall be installed for a facility that has an approved rate of flow of more than 3.4 liters per second nor less than 1.3 L/s, except when specially approved by the Administrative Authority.
- 1011.3 Each plumbing fixture or piece of equipment connected to a grease trap shall be provided with an approved type flow control or restricting device installed in a readily accessible and visible location in the tailpiece or drain outlet of each such fixture. Flow control devices shall be so designed that the flow through such device or devices shall at no time be greater than the rated capacity of the grease trap. No flow control device having adjustable or removable parts shall be approved.

* Sec. 189 NPC 1959

- 1011.4 Each grease trap required by this Section shall have an approved rate of flow which is not less than that given in Table 10-2 for the total number of connected fixtures. The total capacity of fixtures discharging into any such grease trap shall not exceed two and one-half (2-½) times the certified liters per minute flowrate of the grease trap as per Table 10-2.
- Any grease trap installed with inlet more than 1.2 meters lower in elevation than the outlet of any fixture discharging into such grease trap shall have an approved rate of flow which is not less than fifty (50) percent greater than that given in Table 10-2 nor more than four (4) separate fixture shall be connected to or discharged into any one grease trap.
- For the purpose of this Section, the term "fixture" shall mean and include each plumbing fixture, appliance, apparatus or other equipment required to be connected to or discharged into a grease trap by any provision of this Section.
- 1011.5 Each fixture discharging into a grease trap shall be individually trapped and vented in an approved manner. An approved-type grease trap may be used as a fixture outlet and the grease trap for a single fixture when the horizontal distance between the fixture outlet and the grease trap does not exceed 1.2 meters and the vertical tailpipe or drain does not exceed 0.75 meters.
- 1011.6 Grease traps shall be maintained in efficient operating condition by periodic removal of the accumulated grease and settled solids. No such collected grease shall be introduced into the drainage piping and public or private sewer.
- 1011.7 No water jacketed grease trap or grease interceptor shall be approved or installed.
- 1011.8 Each grease trap shall have an approved water seal of not less than 51 mm in depth or the diameter of its outlet, whichever is greater.

Section 1012 – GREASE INTERCEPTORS FOR COMMERCIAL KITCHENS

When grease interceptors are required, a recommended sizing criteria are provided in the Appendix B, Private Sewage Disposal Systems.

Section 1013 – FOOD WASTE DISPOSAL PROHIBITED

- 1013.1 Unless specifically required or permitted by the Administrative Authority, no food waste disposal unit shall be connected to or discharged into any grease interceptor or grease trap.

TABLE 10-2**Grease Traps Capacity**

Total Number of Fixture Connected	Required Rate of Flow Liters per Minute	Grease Retention Capacity, Kilogram
1	76	18
2	95	23
3	132	32
4	189	45

- 1013.2 The vent pipe opening from a soil or waste pipe, except for water closets and similar fixtures, shall not be below the weir of the trap.

TABLE 10-3
Horizontal Distance of Trap Arms

(Except for water closets and similar fixtures)*

Item No.	Trap Arm mm	Distance Trap to Vent mm
1	32	762
2	38	1067
3	51	1524
4	76	1829
5.	102 & larger	3048

Slope one-fourth (1/4) inch per foot (20.9 mm/m), $s = .02$

* The developed length between the trap of a water closet or similar fixture (measured from the top of the closet ring [closet flange] to the inner edge of the vent) and its vent shall not exceed six (6) feet (1829 mm).

Section 1014 - Traps – Described

- 1014.1 Each trap, except one for an interceptor or similar device shall be self-cleaning. Traps for bathtubs, showers, lavatories, sinks, laundry tubs, floor drains, hoppers, urinals, drinking fountains, dental units, and similar fixtures shall be of standard design and weight and shall be of ABS, cast brass, cast iron, lead, PVC, or other approved material. An exposed and readily accessible drawn brass tubing trap, not less than 17 B&S Gauge 1.1 mm, may be used on fixtures discharging domestic sewage but shall exclude urinals. Each trap shall have the manufacturer's name stamped legibly in the metal of the trap and each tubing trap shall have the gauge of the tubing in addition to the manufacturer's name. Every trap shall have a smooth and uniform interior waterway.
- 1014.2 No more than one (1) approved slip joint fitting may be used on the outlet side of a trap, and no tubing trap shall be installed without a listed tubing trap adapter.

TABLE 10-4
Sizing of Grease Interceptors

Number of meals per peak hour ¹	Waste flow x Rate ²	x retention times ³	x storage factor ⁴	=	Interceptor size (liquid capacity)
1.					
2.					
3.					
4.					

1. Meals Served at Peak Hour

2. Waste Flow Rate

- a. With dishwashing machine 6 gallon (22.7 L) flow
- b. Without dishwashing machine 5 gallon (18.9 L) flow
- c. Single service kitchen 2 gallon (7.6 L) flow
- d. Food waste disposer 1 gallon (3.8 L) flow

3. Retention Times

Commercial kitchen waste

- Dishwasher 2.5 hours
- Single service kitchen

 - Single serving 1.5 hours

4. Storage Factors

Fully equipped commercial kitchen 8 hour operation: 1
..... 16 hour operation: 2
..... 24 hour operation: 3

Single Service Kitchen 1.5

Section 1015 - Laundries

Laundry equipment that does not have integral strainers shall discharge into an interceptor having a wire basket or similar device, that is removable for cleaning and that will prevent passage into the drainage system of solids 12.7 mm or larger in maximum dimension, such as string, rags, buttons, or other solid materials detrimental to the public sewerage system.

Section 1016 - Sand Interceptors

Where Required

- 1016.1** Whenever the discharge of a fixture or drain may contain solids or semi-solids heavier than water that would be harmful to a drainage system or cause a stoppage within the system, the discharge shall be through a sand interceptor. Multiple floor drains may discharge into one sand interceptor.
- 1016.2** Sand interceptors are required whenever the Administrative Authority deems it advisable to have a sand interceptor to protect the drainage system.

Section 1017 - Construction and Size

Sand interceptors shall be built of brick or concrete, prefabricated coated steel or other watertight material. The interceptor shall have an interior baffle for full separation of the interceptor into two (2) sections. The outlet pipe shall be the same size as the inlet size of the oil interceptor, the minimum being 76 mm and the baffle shall have two (2) openings of the same diameter as the outlet pipe and at the same invert as the outlet pipe. These openings shall be staggered so that there cannot be a straight line flow between any inlet pipe and the outlet pipe. The invert of the inlet pipe shall be no lower than the invert of the outlet pipe.

The sand interceptor shall have a minimum dimension of 0.2 m² for the net free opening of the inlet section and a minimum depth under the invert of the outlet pipe of 610 mm.

For each 18.9 L per minute flow or fraction thereof over 75.7 L per minute, the area of the sand interceptor inlet section is to be increased by 0.09 m². The outlet section shall at all times have a minimum area of fifty (50) percent of the inlet section.

The outlet section shall be covered by a solid removable cover set flush with the finished floor, and the inlet section shall have an open grating set flush with the finished floor and suitable for the traffic in the area in which it is located.

Chapter 11

STORM DRAINAGE SYSTEM

Section 1101 - GENERAL

Storm drainage are required for roof areas, courts and courtyards to collect stormwater and discharge the stormwater to an approved point of disposal not in conflict with other ordinances or regulations.

Section 1102 – RAINWATER SYSTEMS

1102.1 Materials:

- 1102.1.1 Rainwater downspout or conductor pipings placed within the interior of a building inside a vertical pipe chase or run within a vent shaft shall be of cast iron, galvanized steel, iron, brass, copper, lead, Schedule 40 ABS, DWV, Series 1000, PVC DWV or other approved materials.
- 1102.1.2 Rainwater downspout or conductor located on the exterior side of a low height building shall be not less than 26 ga. galvanized sheet metal. The bottom of the conductor draining over the catch basin storm drain or storm sewer is protected from damage by connecting a stronger material such as steel pipe or cast iron at its lowest section.
- 1102.1.3 Rainwater piping located within a medium height building basement area shall be of galvanized iron pipe, Schedule 30; cast iron soil pipe, S.W.; Type DWV copper tube; Schedule 40 ABS, DWV, Series 1000, PVC DWV, or other approved materials.
- 1102.1.4 Downspouts for high-rise buildings shall be of stronger pipe materials to resist the high hydrostatic pressure inside the vertical downspout installed within the pipe chase which has no intermediate branch from the roof to the ground level.
- 1102.1.5 Rainwater piping commencing 0.6 meter from the exterior of a building may be of suitable approved materials permitted in the Installation Requirements of this Code.

1102.2 Connections and Installation

- 1102.2.1 Rainwater piping shall not be used as soil, waste & vent pipes.
- 1102.2.2 Rainwater piping installed in locations where they may be subjected to damage shall be protected.
- 1102.2.3 Roof drains, overflow drains, and rainwater pipings used in a building construction shall be previously tested and accepted in conformity with the provisions of this Code.

Section 1103 – ROOF DRAIN

1103.1 Materials

Roof drains shall be of cast iron, copper, or other corrosion-resistant materials.

1103.1.1 Strainers

- 1103.1.1.1 Roof drains shall be equipped with strainers extending not less than 100 mm above the surface of the roof immediately adjacent to the drain. Dome-Type Strainers shall have a minimum total net inlet area of one and one-half (1 ½) times the area of the outlet pipe to which it is connected.
- 1103.1.1.2 Roof deck strainers for use on sun decks, parking decks and similar occupied areas shall be an approved flat-surface type which is level with the deck. Such drains shall have a total net inlet area not less than two (2) times the area of the outlet pipe to which the drain is connected.
- 1103.1.1.3 Roof drains passing through the roof into the interior of a building shall be made watertight at the roof level by the use of C.I. drain with integrally cast waterstop ring around the outside of body and placed at mid-depth of the concrete roof slab and the installation of a clamped suitable flashing material around the drain.
- 1103.1.1.4 In all cases the outlet connections are inside-caulk or female screwed.

Section 1104 – SIZING OF RAINWATER PIPING

- 1104.1 Vertical rainwater piping shall be sized in accordance with Table 11-1, which is based upon maximum depth in mm or rainfall per hour falling upon a given roof area in square meter. Consult local rainfall figures to determine maximum rainfall per hour. Normally, a 102 mm/hour rainfall intensity is used around Manila area.
- 1104.2 **Vertical Wall Areas.** Where vertical walls project above a roof so as to permit storm water to drain to adjacent roof area below, the total roof area considered may be computed from Table 11-2 as follows:
- 1104.2.1 For one (1) wall – add fifty (50) percent of area of the wall to the roof area,
- 1104.2.2 For two (2) adjacent walls -- add thirty five (35) percent of the total wall areas to the roof area;
- 1104.2.3 Two (2) walls opposite each other and of same heights – add no additional area to the roof area;
- 1104.2.4 Two (2) walls opposite of differing heights – add fifty (50) percent of wall area above top of lower wall to the roof area.
- 1104.2.5 Walls on three (3) sides – add fifty (50) percent of area of the inner wall below the top of the lowest wall, plus allowance for area of wall above top of the lowest wall per Sections 1104.2.2 and 1104.2.4
- 1104.2.6 Walls of four (4) sides – no allowance for wall areas below top of lowest wall – add for areas above top lowest wall per 1104.2.1, 1104.2.2, 1104.2.4 and 1104.2.5
- 1104.2.7 The area of the side of a tall building exposed to rain is taken as one-half of the gross area.

TABLE 11-1

Sizing of Roof Drains and Downspout Piping for Varying Rainfall Intensities **
Quantities are Horizontal Projected Roof Area in Square Meters

Item No.	Rainfall Intensity per Hour in mm	Diameter of Drain or Leader, Millimeters*					
		51	76	102	127	152	178
(1)	(2)	(3)	(4)	(5)	(6)	(7)	
1	25.4	267.6	817.5	1709.4	3214.3	5016.6	10776.4
2	51	133.8	408.8	854.7	1607.2	2508.3	5388.2
3	76	89.2	272.2	569.5	1071.1	1671.7	3591.5
4	102	66.9	204.4	427.3	803.6	1254.2	2694.1
5	127	53.4	163.5	341.8	642.9	1003.3	2155.3
6	152	44.6	136.6	285.2	535.6	836.1	1794.4
7	178	38.1	117.1	244.3	459.4	716.7	1539.4
8	203	33.4	102.2	213.7	401.8	627.1	1347.1
9	228	29.7	91	190	357.2	557.4	1197.5
10	254	26.9	81.8	170.9	321.4	501.7	1077.6
11	279	24.2	74.3	155.6	292.2	456.1	979.6
12	305	22.3	67.8	142.1	267.6	418.1	897.4

* Round, square, or rectangle rainwater pipe may be used and are considered equivalent when enclosing an inscribed circle equivalent to the drain leader diameter.

** For Manila and Environs, a rainfall intensity of 102 mm per hour is used.

1104.3 **Horizontal Rainwater Piping:** The size of a building rainwater piping or any of its horizontal branches shall be sized in accordance with Table 11-2 (Based upon maximum roof areas to be drained.)

Example: Table 11-2

Roof Area – 548.1 m²

Max Rainfall/hr. – 127 mm

Pipe Laid at (20.9 mm/m) slope or s = .02

Find area in column under 127 mm and at slope of 0.02 and read 561.1 m² (at closest), choose 152 mm as size of leader and downspout at leftmost column.

- 1104.4 **Roof Gutter.** The size of semi-circular bottom roof gutters shall be based on the maximum roof area, in accordance with Table 11-3

Example: Table 11-3

$$\text{Roof Area} = 186 \text{ m}^2$$

$$\text{Max Rainfall/hr.} = 102 \text{ mm}$$

$$\text{Pipe Laid at } 10.4 \text{ mm/m slope or } s = 0.01$$

Find area in column under 102 mm rainfall intensity on Table with $s = .01$ and read 181.4 m^2 (as closest) move to left and read 177.8 mm diameter gutter.

- 1104.5 If the rainfall is more or less than those shown in Table 11-2 and 11-3, then adjust the figures in the 50.8 mm rainfall by multiplying by two (2) and dividing by the maximum rate of rainfall in mm/hour.

Example:

In Table 11-2 with a 10.4 mm/m or $s = .01$ and a 203.2 mm rainfall, find the number of square meter a 102 mm pipe diameter will carry.

$$\text{Solution : } \frac{2 \times 349.3}{8} = 87.4 \text{ m}^2$$

TABLE 11-2a
Size of Horizontal Rainwater Piping

		HORIZONTAL PROJECTED ROOF AREA IN SQ. M.				
ITEM NO.	Size of Pipe In mm w/ Slope 10.4 mm/m (S = .01)	Maximum Rainfall in mm/hr.				
		51	76	102	127	152
(1)	(2)	(3)	(4)	(5)		
1 76.2	152.7	101.8	76.4	61	50.9	
2 101.6	349.3	232.8	174.7	139.7	116.4	
3 127	620.6	413.7	310.3	248.2	206.9	
4 152.4	994	662.7	497	397.6	331.3	
5 203.2	2136.7	1424.2	1068.4	854.7	760	
6 254	3846.1	2564	1923	1540.3	1282	
7 279.4	6187.1	4124.8	3093.6	2475.8	2052.4	
8 381	10126.1	6763.1	5527.6	4422	3683.5	

TABLE 11-2b

		HORIZONTAL PROJECTED ROOF AREA IN SQ. M.				
ITEM NO.	Size of Pipe In mm w/ Slope 20.9 mm/m (S = .02)	Maximum Rainfall in mm/hr.				
		51	76	102	127	152
(1)	(2)	(3)	(4)	(5)		
9 76.2	215.5	143.6	107.8	86.2	71.8	
10 101.6	492.4	328.2	246.2	197	164.1	
11 127	877	584.1	438.5	350.8	292.3	
12 152.4	1402.8	935.1	701.4	561.1	467.6	
13 203.2	3028.5	2019	1514.3	1211.4	1009.5	
14 254	5425.4	3618.5	2712.7	2169.2	1805.9	
15 279.4	8732.6	5815.5	4366.3	349.3	2912.4	
16 381	15607.2	10404.8	7803.6	6247.5	5202.4	

Continuation of TABLE 11-2

TABLE 11-2c

		HORIZONTAL PROJECTED ROOF AREA IN SQ. M.				
ITEM NO.	Size of Pipe in mm w/ Slope 41.7 mm/m (S = .04)	Maximum Rainfall in mm/hr.				
		51	76	102	127	152
(1)	(2)	(3)	(4)	(5)		
17 76.2	305.5	213.2	152.7	121.7	101.8	
18 101.6	698.6	465.4	349.3	279.6	232.3	
19 127	1241.1	826.8	620.6	494.2	413.4	
20 152.4	1988.1	1272.3	994	797.1	633.3	
21 203.2	4274.4	2847.4	2136.7	1709.4	1423.2	
22 254	7692.1	5128.1	3846.1	3079.6	2564	
23 279.4	12374.3	8249.5	6187.1	4942.3	4124.8	
24 381	22110.2	14752.5	11055.1	8853.4	7362.3	

TABLE 11-3a

Size of Circular Bottom Gutters

ITEM NO.	Diameter of Gutter * w/ Slope 5.2 mm/m (S = .005)	HORIZONTAL PROJECTED ROOF AREA IN SQ. M.				
		Maximum Rainfall in Millimeters per Hour				
		51	76	102	127	152
1	76	(1)	(2)	(3)	(4)	(5)
2	102	31.6	21	15.8	12.6	10.5
3	127	66.9	44.6	33.4	26.8	22.3
4	152	116.1	77.5	58.1	46.5	38.7
5	178	178.4	119.1	89.2	71.4	59.5
6	203	256.4	170.9	128.2	102.2	85.3
7	254	369.7	246.7	184.9	147.7	123.1
		668.9	445.9	334.4	267.6	223

TABLE 11-3b

ITEM NO.	Diameter of Gutter * W/ Slope 10.4 mm/m (S = .01)	HORIZONTAL PROJECTED ROOF AREA IN SQ. M.				
		Maximum Rainfall in Millimeters per Hour				
		51	76	102	127	152
8	76	(1)	(2)	(3)	(4)	(5)
9	102	44.6	29.7	22.3	17.8	14.9
10	127	94.8	63.3	47.4	37.9	31.6
11	152	163.5	108.9	81.8	64.4	54.5
12	178	252.7	168.6	126.3	100.8	84.1
13	203	362.3	241.5	181.2	144.9	120.8
14	254	520.2	347.5	260.1	208.1	173.7
		947.6	631.7	473.8	379	315.9

Continuation of TABLE 11-3

TABLE 11-3c

ITEM NO.	Diameter of Gutter * w/ Slope 20.9 mm/m (S = .02)	HORIZONTAL PROJECTED ROOF AREA IN SQ. M.				
		Maximum Rainfall in Millimeters per Hour				
		51	76	102	127	152
		(1)	(2)	(3)	(4)	(5)
15	76	63.2	42.2	31.6	25.3	21
16	102	133.8	89.2	66.9	53.5	44.6
17	127	232.3	155	116.1	92.9	77.5
18	152	357.6	237.8	178.4	142.7	118.9
19	178	512.8	341.9	256.4	204.9	170.9
20	203	739.5	493.3	369.7	295.4	246.7
21	254	133.8	891.8	668.9	534.2	445.9

TABLE 11-3d

ITEM NO.	Diameter of Gutter * w/ Slope 41.7 mm/m (S = .04)	HORIZONTAL PROJECTED ROOF AREA IN SQ. M.				
		Maximum Rainfall in Millimeters per Hour				
		51	76	102	127	152
		(1)	(2)	(3)	(4)	(5)
22	76	89.2	59.5	44.6	35.7	29.7
23	102	189.5	126.3	94.8	75.8	63.2
24	127	328.9	219.2	164.4	131.5	109.6
25	152	514.7	343.3	257.3	206.2	171.9
26	178	724.6	483.1	362.3	289.9	241.4
27	203	1040.5	693	520.2	416.2	346.5
28	254	1858	1238.4	929	743.2	618.7

* Gutter has Semi-Circular bottom. Depth of equivalent area of rectangular gutter = $0.392 \times \text{diameter}$.

TABLE 11-4

Sizing Roof Drains, Leaders, and Vertical Rainwater Piping

Item No.	Size of Drain Leader or Pipe, mm	Flow, L/s	Maximum Allowable Horizontal Projected Roof Areas Square Meters at Various Rainfall Rates					
			25 mm/hr	50 mm/hr	75 mm/hr	100 mm/hr	125 mm/hr	150 mm/hr
			(1)	(2)	(3)	(4)	(5)	(6)
1.	50	1.5	202	101	67	51	40	34
2.	75	4.2	600	300	200	150	120	100
3.	100	9.1	1286	643	429	321	257	214
4.	125	16.5	2334	1117	778	583	467	389
5.	150	26.8	3790	1895	1263	948	758	632
6.	200	57.6	8175	4088	2725	2044	1635	1363

Notes:

1. The sizing data for vertical conductors, leaders, and drains is based on the pipes flowing 7/24 full.
2. For rainfall rates other than those listed, determine the allowable roof area by dividing the area given in the 25 mm/hour column by the desired rainfall rate.
3. Vertical piping may be round, square, or rectangular. Square pipe shall be sized to enclose its equivalent round pipe. Rectangular pipe shall have at least the same cross-sectional area as its equivalent round pipe, except that the ratio of its side dimensions shall not exceed 3 to 1.

TABLE 11-5

Size of Gutters

Item No.	Diameter * of Gutter in mm 5.2 mm/m Slope (s = ½%)	Maximum Rainfall in Millimeters per Hour				
		50.8	76.2	101.6	127.0	152.4
1.	76.2	31.6	21.0	15.8	12.6	10.5
2.	101.6	66.9	44.6	33.4	26.8	22.3
3.	127.0	116.1	77.5	58.1	46.5	38.7
4.	152.4	178.4	119.1	89.2	71.4	59.5
5.	177.8	256.4	170.9	128.2	102.2	85.3
6.	203.2	369.7	246.7	184.9	147.7	123.1
7.	254.0	668.9	445.9	334.4	267.6	223.0

Item No.	Diameter of Gutter in mm 10.4 mm/m Slope (s = 1%)	Maximum Rainfall in Millimeters per Hour				
		50.8	76.2	101.6	127.0	152.4
1.	76.2	44.6	29.7	22.3	17.8	14.9
2.	101.6	94.8	63.8	47.4	37.9	31.6
3.	127.0	163.5	108.9	81.8	65.4	54.5
4.	152.4	252.7	168.6	126.3	100.8	84.1
5.	177.8	362.3	241.5	181.2	144.9	120.8
6.	203.2	520.2	347.5	260.1	208.1	173.7
7.	254.0	947.6	631.7	473.8	379	315.9

* Width of Rectangular Gutter = $0.8862 \times \text{Diameter}$

Continuation of TABLE 11-5

Item No.	Diameter * of Gutter in mm 20.9 mm/m Slope (s = 2%)	Maximum Rainfall in Millimeters per Hour				
		50.8	76.2	101.6	127.0	152.4
1.	76.2	63.2	42.2	31.6	25.3	21.0
2.	101.6	133.8	89.2	65.9	53.5	44.6
3.	127.0	232.3	155.0	116.1	92.9	77.5
4.	152.4	356.7	237.8	178.4	142.7	118.9
5.	177.8	512.8	341.9	256.4	204.9	170.9
6.	203.2	739.5	493.3	369.7	295.4	246.7
7.	254.0	133.8	891.8	668.9	534.2	445.9

Item No.	Diameter of Gutter in mm 41.7 mm/m Slope (s = 4%)	Maximum Rainfall in Millimeters per Hour				
		50.8	76.2	101.6	127.0	152.4
1.	76.2	89.2	59.5	44.6	35.7	29.7
2.	101.6	189.5	126.3	94.8	75.8	63.2
3.	127.0	328.9	219.2	164.4	131.5	109.5
4.	152.4	514.7	343.3	257.3	206.2	171.9
5.	177.8	724.6	483.1	362.3	289.9	241.4
6.	203.2	1040.5	693.0	520.2	416.2	346.5
7.	254.0	1858.0	1238.4	929.0	743.2	618.7

* Width of Rectangular Gutter = 0.8862 Diameter.

Chapter 12

HOUSE DRAINS AND HOUSE SEWERS

Section 1201 – SEWER REQUIRED

- 1201.1 Every building in which plumbing are installed and every premises having drainage piping thereon, shall have a connection to a public or private excreta sewerage system, except as provided in Subsections 1201.2 and 1201.4
- 1201.2 When no public sewer intended to serve any lot or premises is available in any thoroughfare or right-of-way abutting such lot within the premises, drainage piping from any building or works shall be connected to an approved private sewage disposal system by the Administrative Authority.
- 1201.3 Within the limits prescribed in Subsection 1201.4 hereof, the rearrangement or subdivision into smaller parcels of a lot which abuts and is served by a public sewer shall not be deemed cause to permit the construction of a private sewage disposal system; and all plumbing or drainage systems on any such smaller parcel shall connect to the existing public sewer fronting the lots.
- 1201.4 The public sewer may be considered as not being available when such public sewer or any exterior drainage facility connected thereto is located more than 61 meters from any proposed building or exterior drainage facility on any lot or premises thereat.
- 1201.5 No permit shall be issued for the installation, alteration or repair of any private sewage disposal system or part thereof for any lot which can connect with an existing public sewer fronting the lot.
- 1201.6 On every lot or premises hereafter connected to public sewer, all plumbing and drainage systems or parts thereof on such lot or premises shall be connected with such public sewer.

Exception: single family dwellings and buildings or structure accessory thereto, connected to an existing approved private sewage disposal system prior to the time of construction of the public sewer nearby may, when no hazard, nuisance or insanitary condition is evident and a written permission has been obtained from the Administrative Authority, will remain connected to such properly maintained private sewage disposal system when there is no sufficient grade or fall existing to permit proper drainage flow by gravity to the public sewer.

Section 1202 – DAMAGE TO PUBLIC SEWER OR PRIVATE SEWAGE DISPOSAL SYSTEM

- 1202.1 It shall be unlawful for any person to deposit, by any means whatsoever, into any plumbing fixture, catch basin, floor drain, interceptor, sump, receptacle or device which is connected to any excreta plumbing and storm drainage systems, public sewer, private sewer, septic tank or cesspool any ashes, cinders, solids, rags, flammable, poisonous, explosive liquids or gases, oils, grease, and other things whatsoever which would, or could cause damage to the public sewer or private sewage disposal system.
- 1202.2 No rain, surface or subsurface waters shall be connected to or discharged into any excreta drainage system, unless first approved by the Administrative Authority.
- 1202.3 No cesspool and septic tank effluents, seepage pit or underdrain system shall be connected to the excreta building sewer leading to public sewer main.
- 1202.4 No commercial food waste grinder shall be connected to a private or public sewage disposal system unless permission has first been obtained from the Administrative Authority.
- 1202.5 An approved-type watertight sewage or wastewater holding tank, the contents of which, due to their character, must be periodically removed and properly disposed off to some approved off-site location, shall be installed when required by the Administrative Authority or the Health Officer to prevent anticipated surface or subsurface contamination or pollution around the building site, damage to the public sewer or other hazardous or nuisance condition.

Section 1203 – BUILDING SEWER MATERIALS

- 1203.1 The building sewer, beginning 0.6 meter from outside face of wall of building or structure, shall be of such materials as approved by Administrative Authority under the approval procedures set forth in Chapter 12 of this Code
- 1203.2 Jointing methods and materials shall be as prescribed in Chapter 13 of this Code.

Section 1204 – MARKINGS

All pipes, bricks, blocks, prefabricated septic tanks, prefabricated tank or seepage covers or other parts or appurtenance incidental to the installation of building sewers or private sewage disposal systems shall conform to the approval requirements of Chapter 12 of this Code and shall be marked and identified in a manner satisfactory to the Administrative Authority.

Section 1205 – SIZE OF BUILDING SEWERS

The minimum size of any building sewer shall be determined on the basis of the total number of fixture units drained by such sewer, in accordance with Table 12-2. No building sewer shall be smaller than 150 mm diameter nor less in size than the building drain.

Section 1206 – GRADE, SUPPORT, AND PROTECTION OF BUILDING SEWER

- 1206.1 Building sewers shall be run in practical alignment at a uniform slope of not less than two (2) percent or 21 mm per meter toward the point of disposal, i.e. to the septic tank or to the street sewer main.

Exception: When approved by the Administrative Authority and when it is impractical, due to the depth of the street sewer or the structural features or due to adverse arrangement of any building or structure, to obtain a slope of two (2) percent or 21 mm per meter, any such pipe or piping 102 mm and 152.4 mm in diameter may have a slope of not less than $s = 1\%$, (10.5 mm per meter) and any such piping 203 mm diameter and larger may have a slope of not less than $s = 0.5\%$, (5.3 mm per meter).

- 1206.2 Building sewer piping shall be laid on a firm bed throughout its entire length, and any such piping laid on made or filled-in ground shall be laid over concrete cradle or on bed of other approved materials or shall be adequately supported to the satisfaction of the Administrative Authority.
- 1206.3 No building sewer or other drainage piping or part thereof, constructed of materials other than those approved for use underground shall be installed not less than 0.6 meter from the outer face of any building foundation or wall, nor less than 0.3 meter below the finish surface of the ground. The provisions of this Subsection include structures such as porches and steps, whether covered or uncovered, breezeways, roofed "porte cochères", roofed patios, carports, covered walks, covered driveways, and similar structures or appurtenances.

Section 1207 – CLEANOUTS

- 1207.1 Cleanouts shall placed inside the building near the connection between the building drain and the building sewer or installed outside the building at the lower end of the building drain and extended to grade. Two-way clean-out fitting installed at connection point of building drain and building sewer outside the building may be installed in lieu of a single clean-out. Additional building sewer cleanouts shall be installed not to exceed 15 meter on center in straight runs and for each aggregate change in direction exceeding 135 degrees.
- 1207.2 When a building sewer or a branch thereof does not exceed 3 meters in length and is a short straight line extension from a building drain which is provided with a cleanout, no cleanout will be required at its point of connection to the building drain.
- 1207.3 All required building sewer cleznouts shall be extended to grade. When building sewer is located under buildings, the cleanout requirements of Section 1207 shall apply
- 1207.4 Each cleanout shall be installed so that it opens to allow cleaning of horizontal lines in the direction of flow of the soil or wasteline or at right angle thereto, and except in the case of wye branch and end-of-line cleanout, shall be installed vertically above the flow line of the pipe.
- 1207.5 Cleanouts installed under concrete or asphalt paving shall be made accessible by strong yard boxes with hinged cover or extending the top cover with countersunk operating nut flush with paving with approved materials and be adequately protected

1207.6 Approved manholes may be installed in lieu of cleanouts when first approved by the Administrative Authority. The maximum distance between manholes shall not exceed 91 meters.

The inlet and outlet pipe connections of manholes shall be made by the use of flexible compression joints no closer than 0.3 meter from outside of the manhole. No flexible compression joint shall be embedded in the manhole base.

Section 1208 – SEWER AND WATER PIPES

1208.1 Building sewer or drainage piping of clay or materials which are not approved for use within a building shall not be run or laid in the same trench as the water pipes unless both of the following requirements are met:

1208.1.1 The bottom of the water pipe, at all points, shall be at least 0.3 m above the top of the sewer or drain line,

1208.1.2 The water pipe shall be placed on a solid shelf excavated at one side of the common trench with a minimum clear horizontal distance of at least 0.3 meter from the sewer or drain line.

Water pipes crossing sewer or drainage piping constructed of clay or materials which are not approved for use within a building shall be laid a minimum of 0.3 m clear above the sewer or drain pipe. Water pipe joints shall be installed not less than 3 meters away from sewer line in both directions.

Note: For the purpose of this section "within the building" shall mean within the fixed limits of the building foundation.

Section 1209 – LOCATION

1209.1 Except as provided in Subsection 1209.2 no building sewer shall be located in any lot other than the lot which is the site of the building structure or structure served by such sewer, nor shall any building sewer be located at any point having less than the minimum distances indicated in Table 12-1.

1209.2 Nothing contained in this Code shall be construed to prohibit the use of all or part of an abutting lot to:

- 1209.2.1 Provide access to connect a building sewer to an available public sewer, when proper cause and legal easement not in violation of other requirements has been first established to the satisfaction of the Administrative Authority.
- 1209.2.2 Provide additional space for a building sewer when proper cause, transfer of ownership, or change of boundary not in violation of other requirements has been first established to the satisfaction of the Administrative Authority. The instrument recording such action shall constitute an agreement with the Administrative Authority which shall clearly state and show that areas so joined or used shall be maintained as a unit during the time they are so used. Such an agreement shall be recorded in the office of the Local Register of Deeds as part of the conditions of ownership of said properties, and shall be binding on all heirs, successors, and assigns to such properties. A copy of the instrument recording such proceedings shall be filed with the Administrative Authority.

Section 1210 – ABANDONED SEWERS AND SEWAGE DISPOSAL FACILITIES

- 1210.1 Every abandoned building (house) sewer, or part thereof, shall be plugged or capped in an approved manner within 1.5 meters of the property line.
- 1210.2 Every cesspool, septic tank or seepage pit which has been abandoned or has been discontinued from further use or to which no more waste or soil pipeline from plumbing fixtures are connected, shall have the sewage removed therefrom and be completely filled with earth, sand, gravel, concrete, or other approved materials.
- 1210.3 The top cover or arch over the cesspool, septic tank or seepage pit shall be removed before filling and the filling shall not extend above the top of the vertical portions of the sidewalls or above the level of any outlet pipe until inspection has been called and the cesspool, septic tank or seepage pit has been inspected. After such inspection, the cesspool, septic tank or seepage pit shall then be filled to the level of the top of the finish ground.
- 1210.4 No person owning or controlling any cesspool, septic tank or seepage pit in the premises of such person or in that portion of any public street, alley or other public property abutting such premises, shall fail, refuse or neglect to comply from the Department having jurisdiction.

- 1210.5** Where Disposal facilities are abandoned consequent to connecting any premises with the public sewer, the permittee making the connection shall fill all abandoned facilities as required by the Administrative Authority within thirty (30) days from the time of connecting the sewer service line to the public sewer.

TABLE 12-1
**Minimum Horizontal Distance
Required From Building Sewer**

Item No.	Description	Distance	See Note
1	Building or structures	0.6 m	1
2	Property line adjoining private property	Clear	2
3	Water supply wells	15.2 m	3
4	Streams	15.2 m	2
5	On-site domestic water service line	0.3 m	4
6	Public water main	0.3 m	5, 6

Note:

1. *Including porches and steps. Whether covered or uncovered, breezeways, roofed "porte-cochères", roofed patios, carports, covered walks, covered driveways, and similar structures or appurtenances.*
2. *See also Section 1208 of this Code.*
3. *All drainage piping shall clear domestic water supply wells by at least 15.2 m. The distance may be reduced to not less than 7.6 m when the drainage piping is constructed of materials approved for use within a building.*
4. *See Section 1208 of this Code.*
5. *For parallel construction.*
6. *For crossings, approval by the Health Department or other Authority having jurisdiction is required.*

TABLE 12-2
Maximum/Minimum Fixture Unit Loadings
On Building Sewer Piping

Slope, S in Percent, mm/m				
Item No.	Size of Pipe (mm)	S = ½% (5.3 mm/m)	S = 1% (10.5 mm/m)	S = 2% (20.9 mm/m)
1	152	As specified in Table		No minimum loading
2	203	1,950/1,500	2,800/625	3,900/275
3	254	3,400/1,600	4,900/675	6,800/300
4	305	5,600/1,700	8,000/725	11,200/235

Chapter 13

JOINTS AND CONNECTIONS

* Section 1301 – TIGHTNESS

Pressure test on joints and connections of pipes and fittings in the plumbing system shall be required to ensure gastight and watertight connections.

** Section 1302 – TYPES OF JOINTS

- 1302.1 **Caulked Joints** – for bell-and-spigot cast iron soil pipe (CISP) and other similar joints shall be firmly packed with oakum or hemp and filled with molten pig lead to a depth of not less than 25.4 mm. The lead shall be caulked thoroughly at the inside and outside edges of the joint. After caulking, the finished joint shall not extend more than 3.2 mm below the rim of the hub. No paint, varnish or other coatings shall be permitted on the jointing material until after the joint has been tested and approved. Caulked joints in centrifugally cast iron (CCIP) bell-and-spigot water pipe shall be made with non-toxic materials.
- 1302.2 **Threaded Joints** – for iron pipe size (IPS) pipe and fittings shall be standard taper pipe threads. Threads on plastic pipe shall be factory cut or molded. Threaded plastic pipe shall be Schedule 80 minimum wall thickness. Tubing threads shall conform to fine tubing thread standards. When a pipe joint material is used, it shall be applied only on the male threads and such materials shall be approved type, insoluble in water and nontoxic. Cleanout plugs and caps shall be lubricated with water-insoluble, non-hardening material. Tape is acceptable for use on male threads, only if screwed pipe joint.
- 1302.3 **Wiped Joints** – Joints in lead pipe or fittings or between lead pipe or fittings and brass or copper pipe, ferrules, solder nipples or traps shall be full-wiped lead joints. Wiped lead joints shall have an exposed surface on each side of a joint not less than 19 mm and at least as thick as the material being joined. Wall or floor flange lead-wiped joints shall be made by using a lead ring or flange placed behind the joint at wall or floor. Joints between lead pipe and cast iron, steel or wrought iron pipe shall be made by means of a caulking ferrule or soldering nipple.

* Sec. 168 NPC 1959

** Sec. 170 - 173 NPC 1959

- 1302.4 **Solder and Sweat Joints** – Joints in copper tubing shall be made by the appropriate use of approved brass or copper fittings. Surfaces to be joined by soldering shall be cleaned bright by manual or mechanical means. The joints shall be properly fluxed with an approved noncorrosive type flux and made up with approved solder. All solder and fluxes shall be manufactured to approved standards. Solders and fluxes with a lead content which exceeds 0.002 are prohibited in piping systems used to convey potable water.
- 1302.5 **Flared Joints** – for soft copper water tubing shall be made with fittings meeting approved standards. The tubing shall be expanded with a proper flaring tool.
- 1302.6 **Cement Mortar Joints** – Except for repairs and connections to existing lines constructed with such joints, cement mortar joints are prohibited on new building sewers.
- 1302.7 **Burned Lead Joints** – shall be lapped and the assembly shall be fused together to form a uniform weld at least as thick as the lead sheets being joined.
- 1302.8 **Asbestos Cement Sewer Pipe Joints** – shall be a sleeve coupling of the same composition as the pipe or of other approved materials, and sealed with neoprene rubber rings or joined by an approved type compression coupling. Joints between asbestos cement pipe and other approved pipe shall be made by means of an approved adapter coupling.
- 1302.9 **Packing Additives Prohibited** – the addition of leak sealing additives to joint packing is prohibited.
- 1302.10 **Flexible Compression Factory-Fabricated Joints** – When pipe is joined by means of flexible compression joints, such joints shall conform to approved standards and shall not be considered as slip joints.
- 1302.11 **Solvent Cement Plastic Pipe Joints** – Plastic pipe and fittings designed to be joined by solvent cementing shall comply with appropriate IAPMO Installation Standards.

- 1302.12 **Mechanical Joints** – Mechanical joints for centrifugally cast iron water pipe shall conform to nationally recognized standards.
- 1302.13 **Molded Rubber Coupling Joints** – when pipe is joined by means of molded neoprene rubber coupling joints, such joints shall conform to approved standards and shall not be considered as slip joints. When required, appropriate neoprene rubber bushings shall be used to allow for any difference in piping material diameters. Neoprene rubber shall be used in soils subject to oil intrusion.
- 1302.14 **Elastomeric Gasketed and Rubber-ring Joints** – shall comply with the applicable **IAPMO** Installation Standard. Neoprene gaskets are recommended for oil handling piping works.
- 1302.15 **Brazing and Welding** shall conform to applicable standards in the Appendix.
- 1302.16 **Pressure-Lock Type Connection** – A mechanical connection which depends on an internal retention device to prevent pipe or tubing separation. Connection is made by inserting the pipe or tubing inside the fitting to a prescribed depth.
- 1302.17 **Shielded Coupling Joints** – When piping systems are joined by means of shielded couplings, such couplings shall conform to approved standards and shall not be considered as slip joints.
- 1302.18 **Hubless Cast Iron Pipe Joints** – Joints for hubless cast iron soil pipe and fittings shall conform to appropriate **IAPMO** Installation Standards and shall not be considered as slip joints.

Section 1303 – USE OF JOINTS

- 1303.1 **Clay Sewer Pipe** – Joints in vitrified clay pipe or between such pipe and metal pipe shall be joined with neoprene gasket for hub and spigot joints.
- 1303.2 **Cast Iron Pipe** – Joints in cast iron pipe shall be made as provided in Subsection 1302.10 or 1302.12.
- 1303.3 **Screwed Pipe to Cast Iron Pipe** – Joints between wrought iron, steel, brass or copper pipe with cast iron pipe shall be either caulked or threaded joints made as provided in Subsection 1302.1 & 1302.2 or shall be made with approved adapter fittings.

* Sec. 171 NPC 1959

- * 1303.4 **Lead to Cast Iron, Wrought Iron or Steel** – Joints between lead and cast iron, wrought or steel pipe shall be made by means of wiped joints to a caulking ferrule, soldering nipple or bushing.
- 1303.5 **Copper Water Tube** – Joints in copper tubing shall be made by the appropriate use of approved brass fittings properly soldered or brazed together, or by means of approved brass compression type fittings as provided in Subsection 1302.5. Solder shall conform to the requirements of Subsection 1303.4.
- 1303.6 **Plastic Fittings** – Use of job-fabricated Female screws of PVC for water piping are prohibited. Factory made screw and of PVC adaptor fittings are acceptable for use if thickness conform to Schedule 80.

Section 1304 – SPECIAL JOINTS

- 1304.1 **Copper Tubing to Screw Pipe Joints** – Joints with thin-walled copper tubing to thick-walled threaded pipe shall be made by the use of brass adaptor fittings. The joints between the copper tubing and the fittings shall be properly sweated or soldered or made with flared and screw ends adaptor fittings the connection between the threaded pipe and the fitting made with a standard pipe size screw joint. Solder shall conform to the requirements of Subsection 502.4
- * 1304.2 **Slip Joints** – slip joints of approved materials may be used in fixture drains and traps. In fixture supply pipings, slip joints are exposed for faculty in maintenance
- 1304.3 **Expansion Joints** – Expansion joints shall be accessible, except for vent and stacks, and is used in soil and waste stacks to provide for necessary expansion and contraction joints of the pipes for high-rise buildings. In all cases such joints shall be free and accessible
- 1304.4 **Unions** – Approved unions may be used in drainage work when accessibly located in the trap seal or between a fixture and its trap; in the vent system except underground or in wet vents, at accessible points in the water supply piping system and in gas piping.
- 1304.5 **Ground Joint, Flared or Ferrule Connections** – Brass or copper ground joint, flared or ferrule type connections when made up, shall not be considered as slip joints.

* Sec. 174 NPC 1959

** Sec. 176 NPC 1959

- 1304.6 **Plastic Pipe Connection to Other Materials** – When connecting plastic pipe to other types of piping use only approved types of fittings and adapters designed for the specific transition intended.

Section 1305 – FLANGED FIXTURE CONNECTIONS

- 1305.1 Fixture connections between drainage pipes and water closets, floor outlet service sinks, pedestal urinals, and earthenware trap standards shall be made by means of approved brass, hard lead, ABS, PVC, or iron flanges caulked, soldered, solvent cemented or screwed to the drainage pipe. The connection shall be bolted with rust-proofed material and with an approved gasket, washer, or setting compound between the earthenware and the connection. The bottom of the flange shall be set on an approved firm base.
- 1305.2 Closet bends or stubs must be cut off square so as to present a smooth surface even with the top of the closet ring before rough-in inspection is called.
- 1305.3 Wall-mounted water closet fixtures shall be securely bolted to an approved fixture carrier fitting. The connecting piping between the carrier fitting. The connecting piping between the carrier fitting and the fixture shall be an approved material and designed to accommodate an adequately sized gasket. Gasket material shall be graphite-impregnated asbestos, felt, or similar approved types.

*** Section 1306 – PROHIBITED JOINTS AND CONNECTIONS**

- 1306.1 **Drainage System** – Any fitting or connection which has an enlargement, chamber or recess with a ledge, shoulder or reduction of pipe area, that offers an obstruction to flow through the drain is prohibited.
- 1306.2 No fitting or connection that offers abnormal obstruction to flow shall be used. The enlargement of 76 mm closet bend or stub to 102 mm shall not be considered an obstruction.

* Sec. 178 NPC 1959

Section 1307 – WATERPROOFING OF OPENINGS

Joints at the roof around pipes, ducts or other appurtenances shall be made watertight by the use of lead, copper, galvanized iron, or other approved flashing material. Exterior wall openings shall be made watertight. Counterflashing shall not restrict the required internal cross-sectional area of the vent.

*** Section 1308 – INCREASERS AND REDUCERS**

Where different sizes of pipes or pipes and fittings are to be connected, the proper size increasers or reducers or reducing fittings shall be used between the two sizes. Brass or cast iron body cleanouts shall not be used as a reducer or adapter.

** Sec. 177 NPC 1959*

Chapter 14

QUALITY AND WEIGHTS OF MATERIALS, PLUMBING MATERIALS AND REFERENCED STANDARDS

Section 1401- MINIMUM STANDARDS

- 1401.1 Materials, Quality: All materials used in any plumbing or drainage system, or part thereof, shall be free from defects. All pipes, pipe fittings, traps, fixtures, materials and devices used in a plumbing system shall be as listed or labeled in accordance with Table 14-4 of this Code.
- 1401.2 Label, Cast or Stamped: Each length of pipe, fitting, trap, fixture and device used in a plumbing or drainage system shall be integrally embossed, etched, stamped or indelibly marked with the weight or quality thereof and with the maker's logo or name, when such markings are required by the approved applicable standard. All materials and devices used or entering into the installation of the plumbing and drainage systems, or parts thereof, shall be marked and identified in a manner satisfactory to the Administrative Authority. All such markings shall be done at the factory by the manufacturer. Field markings shall not be acceptable.
- 1401.3 Standards listed or referred to in this Chapter cover materials which will conform to the requirements of this Code, when used in accordance with the limitations imposed in this or other Chapters hereof and their listing. Where a standard covers materials of various grades, weights, quality, or configurations, there may be a portion of the listed standard which is applicable. Design and materials for special conditions or materials not provided for herein may be used only by special permission of the Administrative Authority after he has satisfied himself as to their adequacy.
- 1401.4 The provisions of this Code are not intended to prevent at the present time nor in the future the use of any alternate material or method of construction provided any such alternate has been first approved and its use authorized by the Administrative Authority.

Section 1402 – IRON PIPE SIZE (I.P.S.) PIPE

Iron, steel, brass and copper pipes shall be iron pipe size (I.P.S.) with the appropriate weight.

Section 1403 – USE OF COPPER TUBING

- 1403.1 Copper tubes for underground and above ground drainage and vent pipings shall have a weight of not less than that of copper drainage tube, Type Drainage Waste & Vent (DWV) specifications.
- 1403.2 Copper tube shall not be used for piping carrying chemical or industrial wastes as defined in Section 811 of this code.
- 1403.3 Copper tube for water supply piping shall have a weight of not less than Type "L".
- Exception: Type M copper tubing may be used for water piping when piping is above ground inside or atop a building, or underground outside of structures with outside protective coating.*
- 1403.4 In addition to the required incised marking, all hard drawn copper tubing shall be marked by means of a continuous and indelibly colored stripe at least 6.4 mm in width, as follows: Type K, green; Type L, blue; Type M, red; Type DWV, yellow.
- 1403.5 Listed flexible copper water connectors shall be installed in exposed locations, unless otherwise listed.

* Section 1404 – LEAD

See Table 14 – 4, Weight and Thickness of Sheet lead shall not be less than the following:

For safe pans not less than 19.56 kg. Per sq. meter and 1.6 mm thick.

For flashings or vent terminals – not less than 14.63 kg. per sq. meter and 1.2 mm thick.

Lead bends and lead traps shall not be less than 3.2 mm in wall thickness.

Section 1405 – FERRULES AND BUSHINGS

- 1405.1 **Caulking Ferrules:** shall be of the best quality red cast brass, bronze or copper with weights and dimensions in accordance with the following table:

* Sec. 164 NPC 1959

TABLE 14-1
DIMENSIONS AND WEIGHTS OF
*** CAULKING FERRULES**

Pipe Size mm	Inside Diameter mm	Length Mm	Minimum Weight each kg
51	57.2	114.3	.454
76	82.6	114.3	.790
102	108.0	114.3	1.132

1405.2 **Soldering Nipples and Bushings:** Soldering nipples shall be of Bronze, Copper, or heavy cast red brass not less than the following weights:

TABLE 14-2
DIMENSIONS AND WEIGHTS OF
SOLDERING BUSHINGS

Pipe Size mm	Minimum Weight each kg	Pipe Size mm	Minimum Weight each kg
32	.168	63	.622
38	.224	76	.908
51	.392	102	1.586

Section 1406 - CLOSET RINGS (CLOSET FLANGES)

1406.1 Closet rings or closet flanges for water closets or similar fixtures shall be of approved type and shall be bronze, copper, hard lead, cast iron, galvanized malleable iron, ABS, PVC, or other approved materials. Each such closet ring or closet flange shall be approximately 178 mm in diameter and, when installed, shall together with the soil pipe, present a 38 mm wide flange and a groove face to receive the fixture gasket or ball wax.

* Sec. 167 NPC 1959

- 1406.2 Caulked-on closet rings or closet flanges shall not be less than 6.4 mm thick and not less than 51 in overall depth.
- 1406.3 Closet rings or closet flanges shall be burned or soldered to lead bends or lead ferrule or caulked to cast iron soil pipe, solvent cemented to ABS or PVC tubes and screwed or fastened in an approved manner to other pipe materials
- 1406.4 All such closet rings or closet flanges shall be adequately designed and secured to the water closet to support the fixture connected thereto and the water closet base shall be anchored with additional pair of bolts to the concrete floor. There will be four (4) bolts per water closet.
- 1406.5 Closets screws, bolts, washers, and similar fasteners shall be of brass, copper, or other listed equally corrosion resistant materials. All such screws and bolts shall be of adequate size and number to properly connect the floor flange and anchor the fixture to the floor.

* Section 1407 – CLEANOUT FITTINGS

- 1407.1 Each cleanout fitting for cast iron soil pipe shall consist of a cast iron or brass body and an approved screwed brass plug. Each cleanout for galvanized wrought iron, galvanized steel, copper or brass pipe shall consist of a brass plug as specified in Table 14-4 or a standard weight brass cap or an approved ABS or PVC plastic coupling and plug. Plugs shall have raised square heads or approved countersunk rectangular slots, when cleanout is installed along travel ways.
- 1407.2 Each cleanout fitting and each cleanout plug or cap shall be of an approved type. Materials used for cleanouts shall conform to approved standards acceptable to the Administrative Authority.
- 1407.3 Cleanouts shall be designed to be gas and watertight without the use of any gasket, packing or washer.

Section 1408 – THREADED TYPE FITTINGS

- 1408.1 **Screwed Fittings:** shall be ABS, cast iron, copper, copper alloy, malleable iron, PVC, steel, or other approved materials. Threads shall be tapped out of solid metal or factory molded for solid ABS or PVC threads.

* Sec. 187 / 186 NPC 1959

- 1408.2 **Drainage Fittings:** shall be screw jointed of the drainage type having smooth interior waterway and be installed so as to allow two (2) percent slope or 20.9 mm/m grade.

* **Section 1409 – BACKWATER VALVE**

Such valve shall remain sufficiently open during periods of low flows to avoid screening of solids and fibrous materials and shall not restrict capacities or cause excessive turbulence during peak loads. Unless otherwise listed, valve access covers shall be the bolted type with gasket and each valve shall bear the manufacturer's name or logo cast into the body and over the cover.

Section 1410 – VALVES AND FITTINGS

- 1410.1 Gate valves, when used in drainage work, shall be the fullway type with working parts of corrosion resistant metal. Sizes 102 mm or larger in diameter shall have cast iron bodies, and sizes less than 102 mm shall have cast brass or bronze bodies.
- 1410.2 Valves up to and including 51 mm in size shall be all brass or bronze metal.

Section 1411 – ZINC ALLOY COMPONENTS

Shall meet the applicable nationally recognized standards and shall be used in accordance with their listing.

* Sec. 192 NPC 1959

TABLE 14-3

REFERENCE SPECIFICATIONS
FOR PLUMBING MATERIALS

NOTE: Abbreviations used in Table 14-3 refer to standards or specifications issued by the organizations identified below.

No.	Abbreviation	MEANING
1	AHAM	Association of Home Appliance Manufacturers, 20 North Wacker Drive ILLINOIS 60606, 312-984-5800
2	ANSI	American National Standard Institute, 1430 Broadway, New York, New York 10018, 212-354-3300
3	ASME	American Society of Mechanical Engineers, United Engineering Center, 345 E. 47 th Street, New York, New York,
4	ASSE	American Society of Sanitary Engineering, P.O. Box 40362, Bay Village, Ohio 44140, 216-835-3040.
5	ASTM	American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103. Publishes Standards and Tentative Standards, 215-299- 5400
6	AWWA	American Water Works Association, 666 West Quincy Avenue, Denver, Colorado 80235, 303-794-7711.
7	CISPI	Cast Iron Soil Pipe Institute, 5959, Shallowford Road, Suite 419, Chattanooga, Tennessee 37421, 615-892-0137
8	CS & PS	Commercial Standards and Product Standards Representing voluntary standards of trade, prepared under the procedures of the National Bureau of Standards and published by the United States Department of Commerce. Obtainable from Superintendent of Documents, United States Government Printing Office, Washington, D.C. 20402-202- 783-3238
9	FS	Federal Specifications, published by the Federal Specifications Board. Obtainable from the Superintendent of Documents, United States Government Printing Office, Washington D.C. 20402-202-783-3238
10	IAPMO	International Association of Plumbing and Mechanical Officials, 2601 Walnut Drive South, Walnut, California 91789-2825. Publishes Installations (IAPMO) and Product (IAPMO-PS) Standards, 714-595-0449.
11	PDI	Plumbing and Drainage Institute, 1106 W. 77 th Street, South Drive, Indianapolis, Indiana 46260-3318.
12	PNS	Philippine National Standard Certification Mark, Product Standards Agency, Department of Trade and Industry, Sen. Gil Puyat Avenue, Makati City.
13	UL	Underwriter's Laboratories, Incorporated, 333 Pfingsten Road Northbrook, Illinois 60062, 708-272-8800.
14	WQA	Water Quality Association, 4151 Naperville Rd, Lisle, Illinois 60532, 708- 505-0160.
15	ISO	International Standard Organization, Organization for Standardization 1 Rue De Vervende, 1202 Geneva, Switzerland
16	EN	European Committee for Standardization Central Secretariat, 36 Rue De Stassart 1050 Brussels, Belgium

All standards and specifications for materials are subject to change. Designations indicating the year of issue may become obsolete.

TABLE 14-4
PLUMBING MATERIAL STANDARDS

Item No.	ITEM (1)	PNS (2)	ANSI (3)	ASTM (4)	FS (5)	iAPMO (6)	OTHER STANDARDS (7)	ISO (8)	REMARKS (9)
FERROUS PIPE AND FITTINGS:									
1	Cast Iron Screwed Fittings (125 & 250 lb) (56.3 & 113.5 kg.)		D 16.4	A 126					Note 4
2	Cast Iron Soil Pipe and Fittings			A 74					
3	Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Sanitary Systems	1570				CISPI 301 EN 377			
4	Cast Iron Threaded Drainage Fittings		B 16.12			A 888		6594	Note 4
5	Gray Iron and Ductile Iron Pressure Pipe			A 377					
6	Hubless Cast Iron Sanitary and Rainwater Systems (Installation)					IS 6			
7	Malleable Iron Threaded Fittings (150 & 300 lb.) (68.1 & 136.2 kg.)	B 16.3						6594	
8	Neoprene Rubber Gaskets for Hub and Spigot Cast Iron Soil Pipe and Fittings						CISPI HSN		Note 4
9	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless					A 53			
10	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated (Galvanized) Welded and Seamless, for ordinary uses					A 120			
11	Pipe Threads: General Purpose (Inch)					B1.20.1			
12	Roof Drains					A112.21.2 M			Note 4

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Item No.	ITEM (1)	PNS (2)	ANSI (3)	ASTM (4)	FS (5)	IAPMO (6)	OTHER STANDARDS (7)	ISO (8)	REMARKS (9)
13	Shielded Couplings for Use with Hubless Cast Iron Soil Pipe and Fittings					PS 35			
14	Special Cast Iron Fittings					PS 5			Note 4
15	Subdrains For Built-up Shower Pans					PS 16			
16	Threaded Cast Iron Pipe for Drainage, Vent and Waste Services			A 405					
17	Welded and Seamless Carbon Steel and Austenitic Stainless Steel Pipe Nipples				A 733 B 687				Note 4
	NONFERROUS PIPE AND FITTINGS								
18	Brass, Copper, and Chromium-Plated Pipe Nipples								
19	Bronze Pipe Flanges and Flanges Fittings (Class 150 & 300)			B 16.24					
20	Cast Brass and Tinplate P-Traps					PS 2			Note 4
21	Cast Copper Alloy Fittings for Flared Copper Tubes				B 16.26				
22	Cast Bronze Threaded Fittings (Classes 125 & 250)				B 16.15				
23	Cast Copper Alloy Solder-Joint Drainage Fittings-DWV				B 16.23				
24	Cast Copper Alloy Solder-Joint Pressure Fittings				B 16.13				Note 4
25	Copper Drainage Tube (DWV)				B 306				
26	Copper Plumbing Tube, Pipe and Fittings (Installation)					IS 3			
27	Diversion Tees and Twin Waste Elbow					PS 9			Note 4
28	Drains for Prefabricated and Precast Showers					PS 4			Note 4
29	Flexible Metallic Water Connectors					PS 14			Note 4

Item No.	ITEM (1)	PNS (2)	ANSI (3)	ASTM (4)	FS (5)	LAPMO (6)	OTHER STANDARDS (7)	ISO (8)	REMARKS (9)
30	General Requirements for Wrought Seamless Copper and Copper-Alloy Tube			B 251					
31	Seamless Brass Tube			B 135					
32	Seamless Copper Pipe, Standard Sizes			B 42					
33	Seamless Copper Tube			B 75					
34	Seamless Copper Water Tube			B 88					
35	Seamless Red Brass Pipe, Standard Sizes			B 43					
36	Seamless and Welded Copper Distribution Tube (Type D)			B 641					
37	Threadless Copper Pipe			B 302					
38	Tubing Trap Wall Adapters				PS 7				
39	Welded Brass Tube			B 587					
40	Welded Copper-Alloy UNS No. C21000 Water Tube			B 642					
41	Welded Copper and Copper Alloys Water Tube (Installation)					IS 21			
42	Welded Copper Tube			B 447					

Item No.	ITEM (1)	PNS (2)	ANSI (3)	ASTM (4)	FS (5)	IAPMO (6)	OTHER STANDARDS (7)	ISO (8)	REMARKS (9)
43	Welded Copper Water Tube			B 716					
44	Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings		B 16-22						
45	Wrought Copper and Wrought Alloy Solder-Joint Drainage Fittings-DWV		B 16-29						
NON-METALLIC PIPE									
46	Acrylonitrile-Butadiene-Styrene (ABS) Building Drain, Waste and Vent Pipe and Fittings (Installation)					IS 5			Note 4
47	Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain Waste and Vent Pipe			D 2661					Note 4
48	Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain Waste and Vent Pipe with a Cellular Core			F 628					Note 4
49	Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings			D 2751					Note 4
50	Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings (Installation)					IS 11			Note 4
51	Asbestos-Cement Nonpressure Sewer Pipe			C 428					Notes 1 & 3
52	Asbestos-Cement Pressure Pipe (Non-potable water supply)			C 296					
53	Asbestos-Cement Pressure Pipe For Other Liquids						AWWA C400		
54	Asbestos-Cement Pressure pipe For N.P. Water Service or Ward Piping (Installation)						IS 15		

Item No.	ITEM (1)	PNS (2)	ANSI (3)	ASTM (4)	FS (5)	LAPMO (6)	OTHER STANDARDS (7)	ISO (8)	REMARKS (9)
55	Borosilicate Glass Pipe and Fittings for Drain, Waste and Vent (DWV) Applications			C1053					Note 4
56	Chlorinated Polyvinyl Chloride, (CPVC) Plastic Pipe, Schedules 40 and 80			F441					
57	Chlorinated Polyvinyl Chloride (CPVC) Plastic for Hot and Cold Water Distribution System			D2846					
58	Chlorinated Polyvinyl Chloride (CPVC) Solvent Cemented Hot and Cold Water Distribution Systems (Installation)					IS 20			
59	Coextruded Polyvinyl Chloride (PVC) Plastic Pipe with a Cellular Core		F891						
60	Concrete Drain Tile		C412						Note 3
61	Concrete Sewer, Storm Drain and Culvert Pipe		C14						
62	Drain, Waste and Vent (DWV) Plastic Fittings Patterns		D5311						
63	Extra Strength Vitrified Clay Pipe in Building Drains (Installation)					IS 18			Note 4
64	Fittings for Joining Polyethylene Pipe for Water Service and Yard Piping					PS 25			Note 4
65	Joints for IPS PVC Pipe Using Solvent Cement			D2672					

Item No.	ITEM (1)	PNS (2)	ANSI (3)	ASTM (4)	FS (5)	IAPMO (6)	OTHER STANDARDS (7)	ISO (8)	REMARKS (9)
66	Non-Metallic Building Sewers (Installation)					IS 1			
67	Plastic Insert Fittings for Polybutylene (PB) Tubing								Note 4
68	Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe	F845	D 2609						
69	Polybutylene (PB) Cold Water Building Supply and Yard Piping and Tubing (Installation)				IS 17				Note 6
70	Polybutylene Hot and Cold Water Distribution Tubing System Using Insert Fittings (Installation)				IS 22				Note 4
71	Polybutylene Hot and Cold Water Distribution Tubing System Using Compression Joints (Installation)				IS 25				Note 4
72	Polybutylene Hot and Cold Water Distribution Pipe. Tubing and Fitting Systems Using Heat Fusion (Installation)				IS 23				Note 4
73	Polybutylene Hot and Cold Water Distribution Pipe, Tubing Systems Using Pressure-Lock Fittings (Installation)				IS 24				Note 4
74	Polybutylene (PB) Plastic Hot and Cold Water Distribution Systems	D3309	D2662						Note 4
75	Polybutylene (PB) Plastic Pipe (SDR-PR) Based on Controlled Inside Diameter								Note 4
76	Polybutylene (PB) Plastic Tubing	D2666							Note 4
77	Polyethylene (PE) Cold Water Building Supply and Yard Piping (Installation)				IS 7				
78	Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Inside Diameter	D2239							Note 4

Item No.	ITEM (1)	PNS (2)	ANSI (3)	ASTM (4)	FS (5)	LAPMO (6)	OTHER STANDARDS (7)	ISO (8)	REMARKS (9)
79	Polyvinyl Chloride (PVC) Building Drain, Waste and Vent Pipe and Fittings (Installation)			D2729		IS 9		4435	
80	Polyvinyl Chloride (PVC) Cold Water Building Supply and Yard Piping (Installation)	65				IS 8		3633	
81	Polyvinyl Chloride (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings		F949					4422	Note 4
82	Polyvinyl Chloride (PVC) Plastic Drain, Waste and Vent Pipe and Fittings			D2729				4435	
83	Polyvinyl Chloride (PVC) Pressure Rated Pipe (SDR Series)	65		D2241				3633	
84	Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120			D1785				4435	
85	Polyvinyl Chloride (PVC) Plastic Pipe and Fittings (Schedule 40)			D2466				3633	
86	Primers for Use in Solvent Cement Joints of Polyvinyl Chloride (PVC) Plastic Pipe and Fittings		F656						
87	Polyvinyl Chloride (PVC) Sewer Pipes and Fittings			D2729				4422	
88	Unplasticized Polyvinyl Chloride (UPVC) Pipes for Portable Water Supply	65							
89	Rubber Rings for Asbestos-Cement Pipe	D 1869							
90	Safe Handling of Solvent Cements, Primers, and Cleaners (1) for Joining Thermoplastic Pipe and Fittings	F 402							

Item No.	ITEM (1)	PNS (2)	ANSI (3)	ASTM (4)	FS (5)	IAPMO (6)	OTHER STANDARDS (7)	ISO (8)	REMARKS (9)
91	Smoothwall Polyethylene (PE) Pipe for Use in Drainage and Waste Disposal Absorption Fields				F 810				NOTE 4
92	Socket Type Chlorinated Polyvinyl Chloride (CPVC) Plastic Pipe Fittings, Schedule 40				F 438				
93	Socket Type Chlorinated Polyvinyl Chloride (CPVC) Plastic Pipe Fittings, Schedule 80				F 439				
94	Socket Type Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80				D 2467				
95	Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings				D 2235				NOTE 4
96	Solvent Cements for Chlorinated Polyvinyl Chloride (CPVC) Plastic Pipe and Fittings				F 493				
97	Solvent Cements for Polyvinyl Chloride (PVC) Plastic Pipe and Fittings				D 2564				
98	Thermoplastic Accessible and Replaceable Plastic Tube and Tubular Fittings				F 409				NOTE 4

Quality and Weights of Materials, Plumbing Materials and Preferred Standards

Item No.	ITEM (1)	PNS (2)	ANSI (3)	ASTM (4)	FS (5)	IAPMO (6)	OTHER STANDARDS (7)	ISO (8)	REMARKS (9)
99	Type PS-46 Poly (Vinyl Chloride) (PVC) Plastic Gravity Flow Sewer Pipe and Fittings				F 789				
100	Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings			D 3034					
101	Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings Schedule 80			D 2464					
102	Vitrified Clay Pipe, Extra Strength, Standard Strength and Perforated		C 700						Note 4
PLUMBING FIXTURES									
103	Enamelled Cast Iron Plumbing Fixtures	A112.19.1 M			WWP-541				
104	Jetted Whirlpool Bathtubs		A112.19.7						
105	Plastic Bathtub Units		Z124.1		WWP-541				
106	Plastic Lavatories		Z124.3		WWP-541				
107	Plastic Shower Receptors and Shower Stalls		Z124.2		WWP-541				
108	Plastic Water Closet Bowls and Tanks		Z124.4		WWP-541				
109	Plumbing Fixtures for Land Use				WWP-541				
110	Plumbing Requirements for Diverters for Plumbing Fixtures with Hose Spray, Anti-Siphon Type Residential Application				ASSE/ ANSI 1025				
111	Plumbing Requirements for Hand Held Showers				ASSE/ ANSI 1014				
112	Porcelain Enamelled Formed Steel Plumbing Fixtures		ANSI ASME			WWP-541			
113	Stainless Steel Plumbing Fixtures (Designed for Residential Use)			A112.19.4M A112-19.3			WWP-541		
114	Suction Fittings for Use in Swimming and Wading Pools, Spas, Hot Tubs and Whirlpool Bathtub Appliances		ANSI ASME				A112-19.8		

ITEM (1)	PNS (2)	ANSI (3)	ASTM (4)	FS (5)	IAPMO (6)	OTHER STANDARDS (7)	ISO (8)	REMARKS (9)
115 Testing and Rating Procedure for Grease Interceptor						PS 13		NOTE 5
116 Tile Lined Roman Bath Tubs (Installation)						IS 2		
117 Tile Lined Shower Receptors (and Replacements) (Installation)								
118 Trim for Water Closet Bowls, Tanks and Urinals	A112.19.5				WWP-541	IS 4		
119 Various China Plumbing Fixtures					WWP-541			
VALVES								
120 Acrylonitrile-Butadiene-Styrene (ABS) and Polyvinyl Chloride (PVC) Backwater Valves						PS 38		Note 4
121 Backflow Prevention Devices						PS 31		Note 4
122 Backflow Valves (Metal)								
123 Ball Valves 6 inches through 48 inches								
124 Bronze Gate Valves								
125 Cast Iron Gate Valves						WWV-588		UL 352
126 Constant Level Oil Valves								
127 Gate Valves for Water and Sewerage Systems								
128 Globe-Type Locktight Valves-Angle or Straight Pattern								
129 Hose Connection Vacuum Breakers								
								ASSE 1011

Quality and Weights of Materials, Plumbing Materials and Referenced Standards

Item No.	ITEM (1)	PNS (2)	ANSI (3)	ASTM (4)	FS (5)	IAPMO (6)	OTHER STANDARDS (7)	ISO (8)	REMARKS (9)
130	Individual Shower Control Valves Anti Scald Type		ANSI/ASSE 1016					ASSE 1016	
131	Laboratory Faucet Vacuum Breakers		ANSI/ASSE 1035						
132	Pipe Applied Atmospheric Type Vacuum Breakers		ANSI/ASSE 1001					ASSE 1001	
133	Plumbing Fixture Fittings			A112.18 1M					
134	Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems and Addendum			Z21.22					132
135	Temperature Actuated Mixing Valves for Primary Domestic Use		ANSI/ASSE 1017						
136	Trap Seal Primer Valves (Drainage Type)		ANSI/ASSE 1044						
137	Trap Seal Primer Valves (Water Supply Fed)		ANSI/ASSE 1018						

Item No.	ITEM (1)	PNS (2)	ANSI (3)	ASTM (4)	FS (5)	IAPMO (6)	OTHER STANDARDS (7)	ISO (8)	REMARKS (9)
MISCELLANEOUS									
159	Black Plastic Poly (Vinyl Chloride) (PVC) or Polyethylene (PE) Pressure Sensitive Corrosion Preventive Tape						PS 37		
160	Cleanouts				Aii12 36.2				Note 4
161	Chlorinated Polyethylene (CPE) Sheeting for Containment				D 4068				
162	Compression Joints for Vitrified Clay Pipe and Fittings				C 425				Note 4
163	Copper Alloy Sand Castings for General Applications				B 584				Note 2
164	Copper Sheet Strip, Plate and Rolled Bar				B 152				
165	Dishwasher Drain Airgaps						PS 23		
166	Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets				C 443				
167	General Requirements for Steel Sheet, Zinc Coated (Galvanized) by the Hot Dip Process				A 525				
168	Lead-Free Sealing Compounds for Threaded Joints						PS 36		

Item No.	ITEM (1)	PNS (2)	ANSI (3)	ASTM (4)	FS (5)	IAPMO (6)	OTHER STANDARDS (7)	ISO (8)	REMARKS (9)
169	Low Pressure Air Test for Building Sewers (Installation)								
170	Pipe Hangers and Supports-Materials, Design and Maintenance						IS 16		
171	Plant Applied Protective Pipe Coatings								
172	Poly (Vinyl Chloride) (PVC) Plastic Flexible Concealed Water - Containment Membrane			D 4551			PS 22		
173	Polyethylene Encasement Sleeve for Portable Water Pipe and Tubing						PS 34		
174	Prefabricated Septic Tanks						PS 1		
175	Protectively Coated Pipe (Installation)						IS 13		
176	Rubber Gaskets for Cast Iron Soil Pipe and Fittings				C 564				
177	Rubber Rings for Asbestos-Cement Pipe				D 1869				
178	Solder, Tin Alloy, Lead Tin Alloy, and Lead Alloy (and Flux, Type AC Only)			B 32	QQ-S-571e				

1. Limited to domestic usage
2. Alloy C85200 for cleanout plugs
3. Type II only
4. Although this Standard(s) is referenced in this table, materials not listed With the bureau of product standards (BPS) shall need the appropriate approval or Phil. National Standard (PNS)
5. PDI Standard G101 by reference.
6. Limited nylon material only.

Quality and Weights of Materials, Plumbing Materials and Referenced Standards

Item No.	ITEM (1)	PNS (2)	ANSI (3)	ASTM (4)	PS (5)	JAPMO (6)	OTHER STANDARDS (7)	ISO (8)	REMARKS (9)
147	Home Laundry, Equipment (Plumbing Requirements For)		ANSI/AH AM HLW-2PR					WQA S-100	
148	Household Commercial and Portable Exchange Water Softeners							WQA S-200	
149	Household and Commercial Water Filters							UL 749	
150	Household Dishwashers							AHAM DW-1	
151	Household Dishwashers (Drain Hose)		ANSI/AH AM DW-2PR						
152	Household Dishwashers (Plumbing Requirements For)							UL 174	
153	Household Electric Storage Tank Water Heaters								
154	Household Food Waste Disposer Units (Plumbing Requirements For)		ANSI/AH AM FWD-2PR						
155	Ice Makers							UL 563	
156	Motor Operated Water Pumps							UL 778	
157	Oil Fired Water Heaters							UL 732	
158	Point-Of-Use Low Pressure Reverse Osmosis Drinking Water Systems							WQA S300	

APPENDIX A

Appendix A

RECOMMENDED RULES FOR SIZING THE WATER SUPPLY SYSTEM

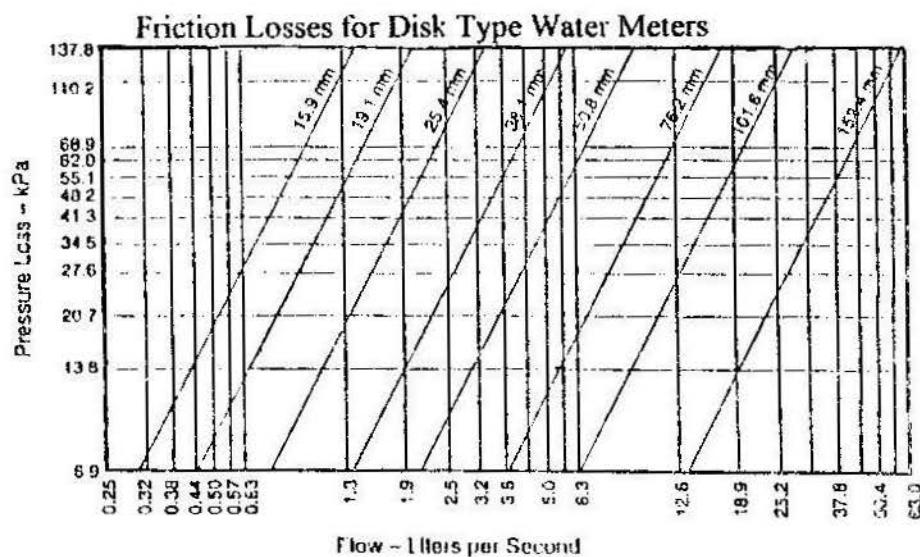
Because of the variable conditions encountered, it is impractical to lay down definite detailed rules of procedure for determining the sizes of water supply pipes in an appendix which must necessarily be limited in length.

The following is a suggested order of procedure for sizing the water supply system.

A.1 Preliminary Information

- A 1.1 Obtain the necessary information regarding the minimum daily service pressure in the area where the building is to be located.
- A 1.2 If the building supply is to be metered, obtain information regarding friction loss relative to the rate of flow for meters in the range of sizes likely to be used. Friction-loss data can be obtained from most manufacturers of water meters. Friction losses for disk type meters may be obtained from Chart A-1.

CHART A-1



- A 1.3 Obtain all available local information regarding the use of different kinds of pipe with respect both to durability and to decrease in capacity with length of service in the particular water supply

A.2 DEMAND LOAD

- A.2.1 Estimate the supply demand for the building main and the principal branches and risers of the system by totaling the fixture units on each, Table A-1, and then by reading the corresponding ordinate from Chart A-2 or A-3, whichever is applicable.
- A.2.2 Estimate continuous supply demands in liters per second for lawn sprinklers, air conditioners, etc., and add the sum to the total demand for fixtures. The result is the estimated supply demand of the building supply.

A.3 PERMISSIBLE FRICTION LOSS

- A.3.1 Decide what is the desirable minimum pressure that should be maintained at the highest fixture in the supply system. If the highest group of the fixtures contains flushometer valves, the pressure for the group should not be less than 103.42 kPa. For flush tank supplies, the available pressure may not be less than 55.16 kPa.
- A.3.2 Determine the elevation in meters of the highest fixture or group of fixtures above the water (street) main. Multiply this difference in elevation by 9.79. The result is in the loss in static pressure in kPa.
- A.3.3 Subtract the sum of loss in static pressure and the pressure to be maintained at the highest fixture from the average minimum daily service pressure. The result will be the pressure available for friction loss in the supply pipes, if no water meter is used. If a meter is to be installed, the friction loss in the meter for the estimated maximum demand should also be subtracted from the service pressure to determine the pressure loss available for friction loss in the supply pipes

TABLE A-1

Demand Weight of Fixtures in Water Supply Fixture Units¹

Fixture Type ²	Weight in Water Supply Fixture Units ³ (WSFU)		Minimum Connections	
	Private	Public	Cold Water	Hot Water
Bathtub ⁴	2	4	13	13
Bedpan washer		10	25	
Bidet	2	4	13	13
Combination sink and tray	3		13	13
Dental unit or cuspidor		1	10	
Dental lavatory	1	2	13	13
Drinking fountain	1	2	10	
Kitchen sink	2	4	13	13
Lavatory	1	2	10	10
Laundry tray (1 or 2 compartments)	2	4	13	13
Shower, each head ⁴	2	4	13	13
Sink, service	2	4	13	13
Urinal, pedestal		10	25	
Urinal (wall lip)		5	13	
Urinal stall		5	19	
Urinal with flush tank		3		
Wash sink, circular or multiple (each set of faucets)		2	13	13
Water Closet:				
Flushometer-tank	3	5	10	
Flushometer valve	6	10	25	
Flush tank	3	5	10	

1. For supply outlets likely to impose continuous demands, estimate continuous supply separately and add to total demand for fixtures.
2. For fixtures not listed, weights may be assumed by comparing the fixture to a listed one using water in similar quantities and at similar rates.
3. The given weights are for total demand for fixtures with both hot and cold water supplies. The weights for maximum separate demands may be taken as seventy-five (75) percent of the listed demand for the supply.
4. Shower over bathtub does not add fixture unit to group.

TABLE A-2

*Allowance in Equivalent Length of Pipe for Friction Loss
in Valves and Threaded Fittings **

Equivalent Length of Pipe for Various Fittings

Diameter of fitting meter	90° Standard Elbow meter	45° Standard Elbow meter	Standard Tee 90° meter	Coupling or Straight Run of Tee meter	Gate Valve meter	Globe Valve meter	Angle Valve meter
9.5	0.3	0.2	0.5	0.1	0.1	2.4	1.2
12.7	0.6	0.4	0.9	0.2	0.1	4.6	2.4
19.1	0.8	0.5	1.2	0.2	0.2	6.1	3.6
25.4	0.9	0.5	1.5	0.3	0.2	7.6	4.6
31.8	1.2	0.7	1.8	0.4	0.2	10.6	5.5
38.1	1.5	0.9	2.1	0.5	0.3	13.7	6.7
50.8	2.1	1.2	3	0.6	0.4	16.7	8.5
63.5	2.4	1.5	3.6	0.8	0.5	19.8	10.3
76.2	3	1.8	4.6	0.9	0.6	24.3	12.2
101.6	4.3	2.4	6.4	1.2	0.8	38	16.7
127	5.2	3	7.6	1.5	1	42.6	21.3
152.4	6.1	3.6	9.1	1.8	1.2	50.2	24.3

* Allowances are based on non-recessed threaded fittings. Use one-half (1/2) the allowances for recessed threaded fittings or streamline solder fittings.

- A 3.4 Determine the developed length of pipe from the water (street) main to the highest fixture. If close estimates are desired, compute with the aid of Table A-2 the equivalent length of pipe for all fittings in the line from the water (street) main to the highest fixture and add the sum to the developed length. The pressure available for friction loss in kPa divided by the developed lengths of pipe from the water (street) main to the highest fixture, times one hundred (100), will be the average permissible friction loss per 30.4 m. length of pipe.

A.4 SIZE OF BUILDING SUPPLY

- A 4.1 Knowing the permissible friction loss per 30.4 m of pipe and the total demand, the diameter of the building supply pipe may be obtained from Charts A-4, A-5, A-6, or A-7, whichever is applicable. The diameter of pipe on or next above the coordinate point corresponding to the estimated total demand and the permissible friction loss will be the size needed up to the first branch from the building supply pipe
- A 4.2 If copper tubing or brass pipe is to be used for the supply piping, and if the character of the water is such that only light changes in the hydraulic characteristics may be expected, Chart A-4 may be used.
- A 4.3 Chart A-5 should be used for ferrus pipe with only the most favorable water supply as regards corrosion and caking. If the water is hard or corrosive, Charts A-6 or A-7 will be applicable. For extremely hard water, it will be advisable to make additional allowances for the reduction of capacity of hot water lines in service

A.5 SIZE OF PRINCIPAL BRANCHES AND RISERS

- A 5.1 The required size of branches and risers may be obtained in the same manner as the building supply by obtaining the demand load on each branch or riser and using the permissible friction loss computed in Section A-3.

- A 5.2 Fixture branches to the building supply, if they are sized for the same permissible friction loss per 30.4 m of pipe as the branches and risers to the highest level in the building, may lead to inadequate water supply to the upper floor of a building. This may be controlled by: (1) selecting the sizes of pipe for the different branches so that the total friction loss in each lower branch is approximately equal to the total loss in the riser, including both friction loss and loss in static pressure; (2) throttling each such branch by means of a valve until the preceding balance is obtained; (3) increasing the size of the building supply and risers above the minimum required to meet the maximum permissible friction loss.
- A 5.3 The size of branches and mains serving flushometer tanks shall be consistent with sizing procedures for flush tank water closets.

A.6 GENERAL

- A 6.1 Velocities shall not exceed 3 m/sec of the maximum values given in the appropriate installation Standard, except as otherwise approved by the Administrative Authority.
- A 6.2 If a pressure reducing valve is used in the building supply, the developed length of a supply piping and the permissible friction loss should be computed from the building side of the valve.
- A 6.3 The allowances in Table A-2 for fittings are based on nonrecessed threaded fittings. For recessed threaded fittings and streamlined soldered fittings, one ($\frac{1}{2}$) the allowances given in the table will be ample.

A 7 EXAMPLE

- A 7.1 Assume an office building of four (4) stories and basement: pressure on the building side of the pressure reducing valve of 379 kPa (after an allowance for reduced pressure "fall off" at peak demand); an elevation of highest fixture above the pressure reducing valve of 13.7 m a developed length of pipe from the pressure reducing valve to the most distant fixture of 60.8 m and fixtures to be installed with flush valves for water closets and stall urinals as follows:

Example:

Fixture Units and Estimated Demands

Building Supply				Branch to hot-water supply		
Kind of Fixtures	No. of Fixtures	Fixture Units	Demand Liters per second	No. of Fixtures	Fixture Units	Demand Liters per second
Water closets	130	1,300				
Urinals	30	150				
Shower Heads	12	48		12	$12 \times 4 \times .75 = 36$	2.3 L/s
Lavatories	130	260		130	$130 \times 2 \times .75 = 195$	12.3 L/s
Service Stns	27	106		27	$27 \times 4 \times .75 = 81$	5.1 L/s
Total		1,866	19.7 L/s		312	6.7 L/s

Allowing for 103.4 kPa at the highest fixture under the maximum demand of 19.6 L/s, the pressure available for friction loss is found by the following:

$$379 - [103.4 + (13.7 \times 9.8)] = 142.3 \text{ kPa}$$

The allowable friction loss per 30.4 m of pipe is therefore:

$$30.4 \times 142.3 + 60.8 = 71.1 \text{ kPa}$$

If the pipe material and water supply are such that Chart A-5 applies, the required diameter of the building supply is 76.2 mm and the required diameter of the branch to the hot water is 50.8 mm.

The sizes of the various branches and risers may be determined in the same manner as the size of the building supply or the branch to the hot water system by estimating the demand for the riser or branch from Charts A-2 or A-3, and applying the total demand estimate from the branch, riser or section thereof, to the appropriate flow chart.

CHART A-2
Estimate Curves for Demand Load

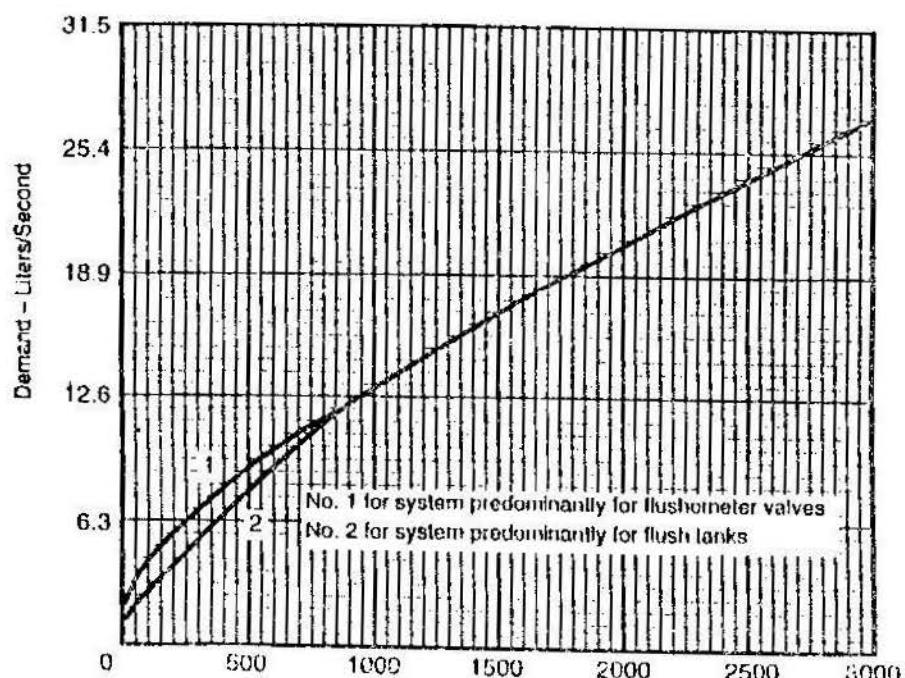


CHART A-3

Enlarged Scale Demand Load

Fixture Units

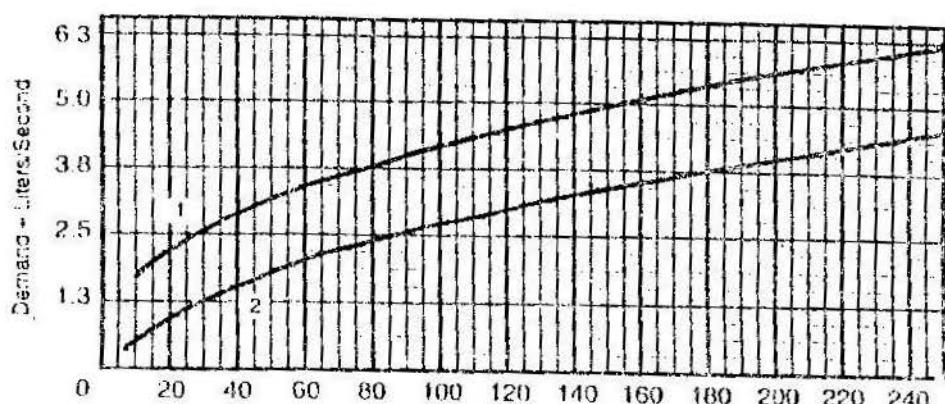


CHART A-4

Friction Loss – 32.9 Pa/m

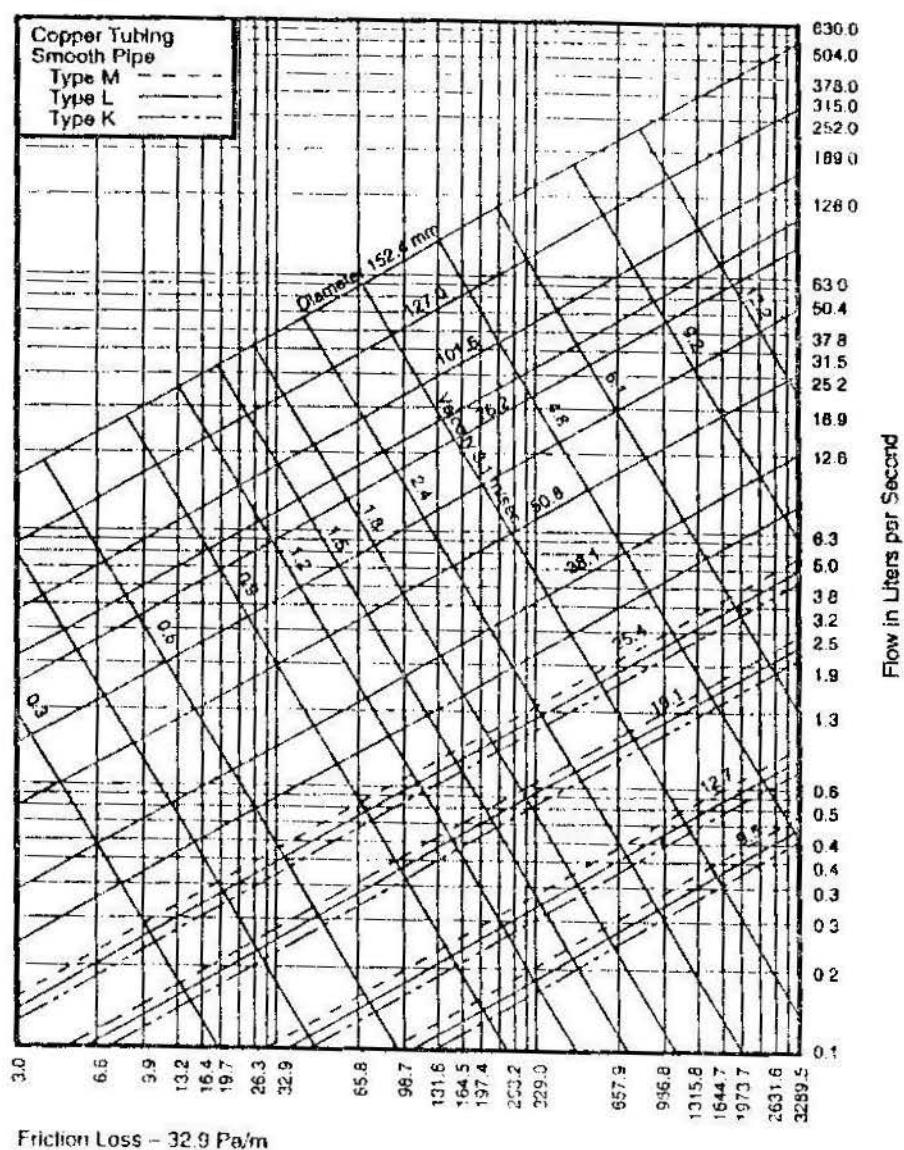


CHART A-5

Friction Loss - 32.9 Pa/m

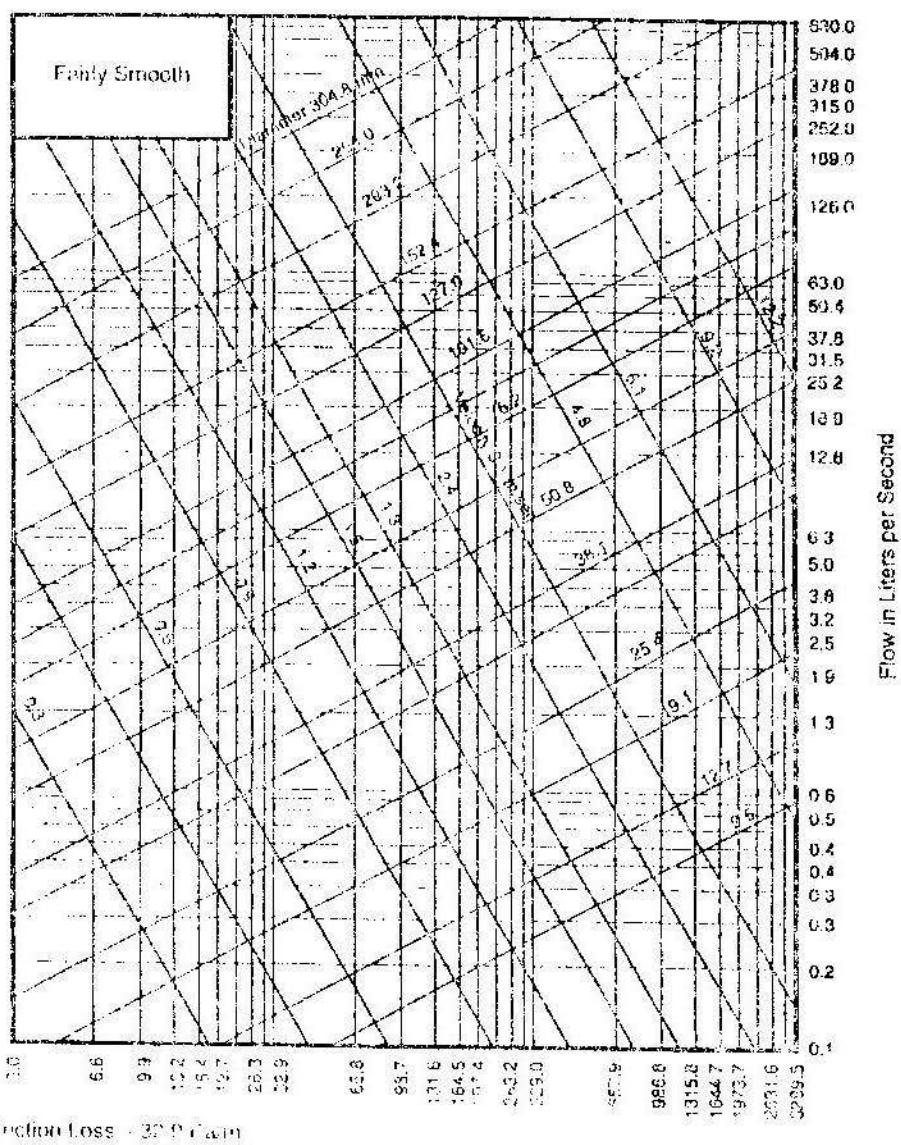


CHART A-6

Friction Loss – 32.9 Pa/m

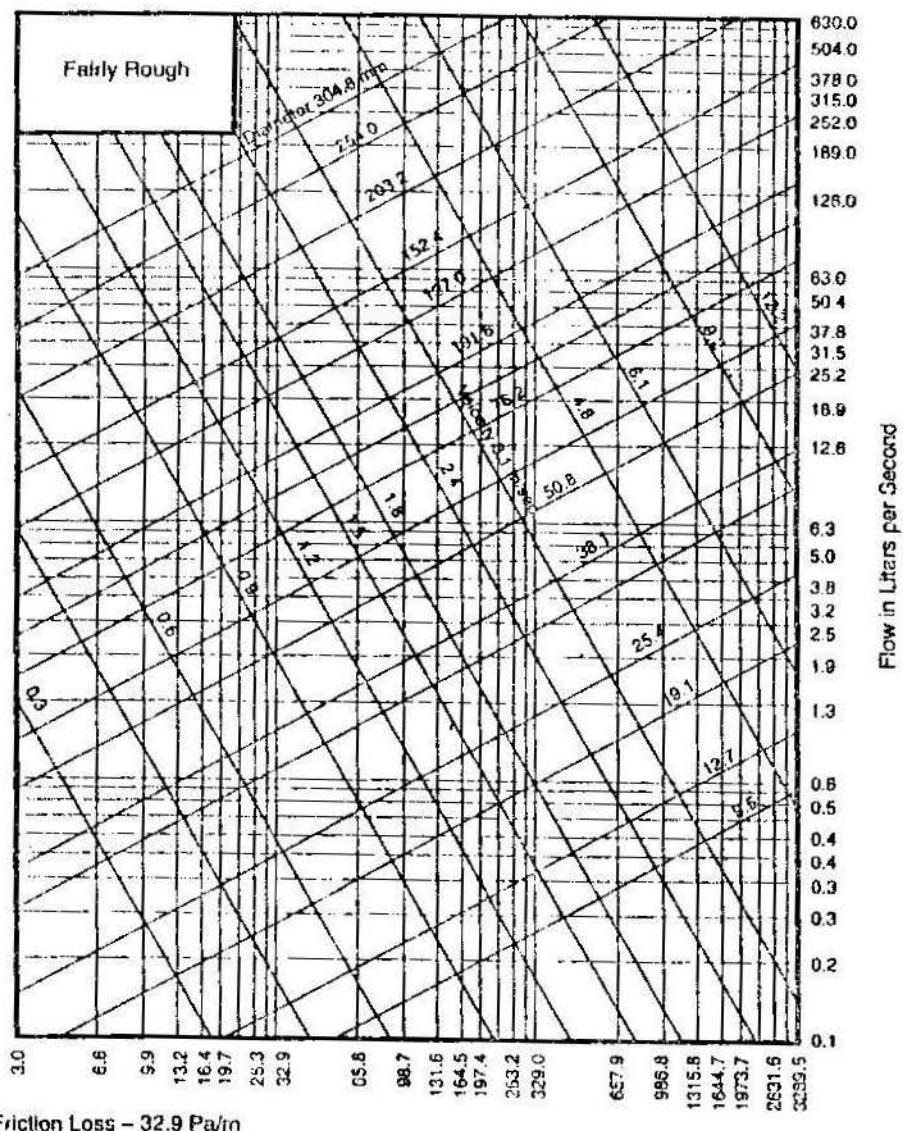
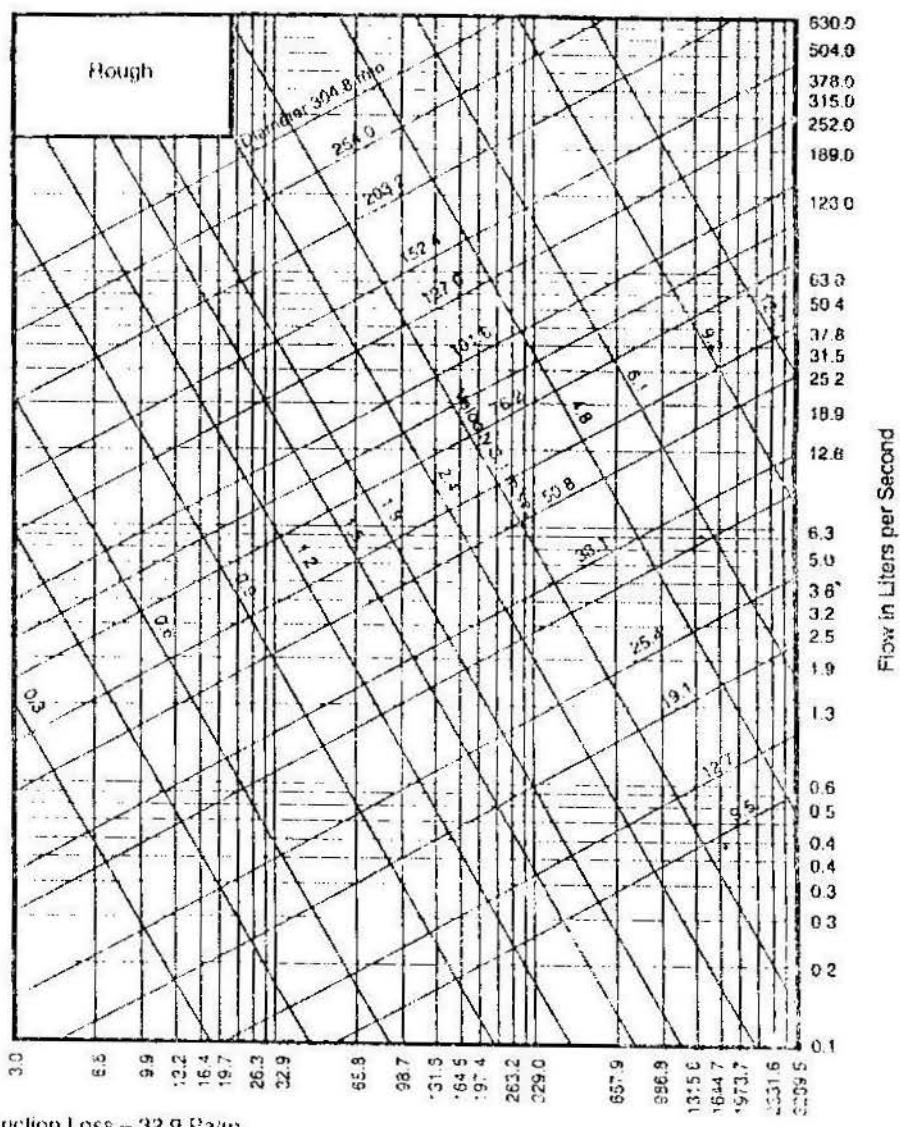


CHART A-7

Friction Loss - 32.9 Pa/m



Friction Loss - 32.9 Pa/m

APPENDIX B

Appendix B

PRIVATE SEWAGE DISPOSAL SYSTEMS

B.1 Private Sewage Disposal (General)

Where permitted by the rules and regulations of the Department of Environment and Natural Resources (DENR), the building sewer may be connected to a private sewage disposal system complying with the provisions of this appendix. The type of system shall be determined on the basis of location, soil porosity, and ground water level and shall be designed to receive all sewage from the property. The system, except as otherwise approved, shall consist of a septic tank with effluent discharging into a subsurface disposal field, into one (1) or more seepage pits or into a combination of subsurface disposal field and seepage pits.

B.2 Capacity of Septic Tanks

The liquid capacity of all septic tanks shall conform to Tables B-2 and B-3 as determined by the number of bedrooms or apartment units in dwelling occupancies and the estimated waste/sewage design flow rate or the number of plumbing fixture units as determined from Table 7-2, whichever is greater in other building occupancies. The capacity of any one septic tank and its drainage system shall be limited by the soil structure classification, as specified in Table B-5.

B.3 Area of Disposal Fields and Seepage Pits

B 3 1 The minimum effective absorption area in disposal fields in m^2 , and in seepage pits in m^2 of side wall, shall be predicated on the required septic tank capacity in liters and/or estimated waste/sewage flow rate, whichever is greater, and shall conform to Table B-4 as determined for the type of soil found in the excavation, and shall be as follows:

B 3 1 1 When disposal fields are installed, a minimum of $14\ m^2$ of trench bottom shall be provided for each system exclusive of any hard pan, rock, clay, or other impervious formations. Side wall area in excess of the required 304.8 mm and not to be exceed 914.4 mm below the leach line may be added to the trench bottom area when computing absorption areas.

B 3.1.2 Where leaching beds are permitted in lieu of trenches, the area of each such bed shall be at least fifty (50) percent greater than the tubular requirements for trenches. Perimeter side wall area in excess of the required 304.8 mm and not to exceed 914.4 mm below the leach line may be added to the trench bottom area when computing absorption areas.

B 3.1.3 No excavation for a leach line or leach bed shall extend within 1.5 m of the water table nor to a depth where sewage may contaminate the underground water stratum that is usable for domestic purposes.

Exceptions: In areas where the records or data indicate that the ground water are grossly degraded, the 1.5 m separation requirement may be reduced by the Administrative Authority. The applicant shall supply evidence of ground water depth to the satisfaction of the Administrative Authority.

B 3.1.4 The minimum effective absorption area in any seepage pit shall be calculated as the excavated side wall area below the inlet exclusive of any hardpan, rock, clay, or other impervious formations.

The minimum required area of porous formation shall be provided in one or more seepage pits. No excavation shall extend within 3 m of the water table nor to a depth where sewage may contaminate underground water stratum that is usable for domestic purposes.

Exceptions: In areas where the records or data indicate that the ground waters are grossly degraded, the 3 m separation requirement may be reduced by the Administrative Authority.

The applicant shall supply evidence of ground water depth to the satisfaction of the Administrative Authority.

B.4 Percolation Test

B 4.1 Wherever practicable, disposal field and seepage pit sizes shall be computed from Table B-4.

B 4.2 In order to determine the absorption qualities of questionable soils other than those listed in Table B-4, the proposed site shall be subjected to percolation tests acceptable to the Administrative Authority.

B.5 Septic Tank Construction

- B 5.1 Plans for all septic tanks shall be submitted to the Administrative Authority for approval. Such plans shall show all dimension, reinforcing, structural calculations, and such other pertinent data as may be required.
- B 5.2 Septic tanks design shall be such as to produce a clarified effluent consistent with accepted standards and shall provide adequate space for sludge and scum accumulations.
- B 5.3 Septic tanks shall be constructed of solid durable materials, not subject to excessive corrosion or decay and shall be watertight.
- B 5.4 Septic tanks shall have a minimum of two (2) compartments. The inlet compartment of any septic tank shall be not less than two-thirds (2/3) of the total capacity of the tank, nor less than 2 m³ liquid capacity, and shall be at least .9 m in width and 1.5 m in length. Liquid depth shall be not less than .6 m nor more than 1.8 m. the secondary compartment of any septic tank shall have a minimum capacity of 1 m³ and a maximum capacity of one-third (1/3) of the total capacity of such tank. In septic tanks having over 6 m³ capacity, the secondary compartment may be not less than 1.5 m in length.
- B 5.5 Access to each septic tank shall be provided by at least two (2) manholes 508 mm in minimum dimension or by an equivalent removable cover slab. One access manhole shall be located over the inlet and one (1) access manhole shall be located over the outlet. Wherever a first compartment exceeds 3.7 m in length, an additional manhole shall be provided over the baffle wall.
- B 5.6 The inlet and outlet pipe openings shall be not less in size than the connecting sewer pipe. The vertical leg of a round inlet and outlet fittings shall not be less in size than the connecting sewer pipe nor less than 104.6 mm. A baffle type fitting shall have the equivalent cross-sectional area of the connecting sewer pipe and not less than a 106.6 mm horizontal dimension when measured at the inlet and outlet pipe inverts

- B 5.7 The inlet and outlet pipe or baffle shall extend 101.6 mm above and at least 304.8 mm below the water surface. The invert of the inlet pipe shall be at a level not less than 50.8 mm above the invert of the outlet pipe.
- B 5.8 Inlet and outlet pipe fittings or baffles, and compartment partitions shall have a free vent area equal to the required cross-sectional area of the house sewer or private sewer discharging thereinto to provide free ventilation above the water surface from the disposal field or seepage pit through the septic tank, house sewer, and stack to the outer air.
- B 5.9 The side walls shall extend at least 228.6 mm above the liquid depth. The cover of the septic tank shall be at least 50.8 mm above the back vent openings.
- B 5.10 Partitions or baffles between compartments shall be of solid durable material and shall extend at least 101.6 mm above the liquid level. An inverted fitting equivalent in size to the tank inlet, but in no case less than 104.6 mm in size, shall be installed in the inlet compartment side of the baffle with the bottom of the fitting placed midway in the depth of the liquid. Wooden baffles are prohibited.
- B 5.11 Each such tank shall be structurally designed to withstand all anticipated earth or other loads. All septic tank covers shall be capable of supporting an earth load of not less than 14.4 kPa when the maximum coverage does not exceed 9 m.
- B 5.12 Septic tanks installed under concrete or black top paving shall have the required manholes accessible by extending the manhole openings to grade in a manner acceptable to the Administrative Authority.

B 5.13 Materials

B 5.13.1 Concrete Septic Tanks

All concrete septic tanks shall be protected from corrosion by coating with an approved bituminous coating or by other acceptable means. The coating shall extend to at least 101.6 mm below the water line and shall cover all of the internal area above that point.

B 5.13.2 Steel Septic Tanks

The minimum wall thickness of any steel tank shall be No. 12 U.S. gauge (.109) (2.8 mm) and each such tank shall be protected from corrosion, both externally and internally, by an approved bituminous coating or by other acceptable means.

B 5.13.3 Alternate Materials

- (a) Septic tanks constructed of alternate materials may be approved by the Administrative Authority when complying with approved applicable standards.
- (b) Wooden septic tanks are prohibited.

B 5.13.4 Prefabricated Septic Tanks

- (a) Manufactured or prefabricated septic tanks shall comply with all approved applicable standards and be approved by the Administrative Authority.
- (b) Independent laboratory tests and engineering calculations certifying the tank capacity and structural stability shall be provided as required by the Administrative Authority.

B.6 Disposal Fields

- B 6.1 Distribution lines shall be constructed of clay tile laid with open joints, perforated clay pipe, perforated bituminous fiber pipe, perforated high density polyethylene pipe, perforated ABS pipe, perforated PVC pipe, or other approved materials, provided that sufficient openings are available for distribution of the effluent into the trench area.
- B 6.2 Before placing filter material or drain lines in a prepared excavation, all smeared or compacted surfaces shall be removed from trenches by raking to a depth of 25.4 mm and the loose material removed. Clean stone, gravel, slag, or similar filter material acceptable to the Administrative Authority, varying in size from 19.1 mm to 63.5 mm shall be placed in the trench to the depth and grade required by this

section. Drain pipe shall be placed on filter material in an approved manner. The drain lines shall then be covered with filter material to the minimum depth required by this section and this covered with untreated building paper, straw, or similar porous material to prevent closure of voids with earth backfill. No earth backfill shall be placed over the filter material cover until after inspection and acceptance.

- B 6.3 A grade board staked in the trench to the depth of the filter material shall be utilized when distribution line is constructed with drain tile or a flexible pipe material which will not maintain alignment without continuous support.
- B 6.4 When seepage pits are used in combination with disposal fields, the filter material in the trenches shall terminate at least 1.5 m from the pit excavation and the line extending from such points to the seepage pit shall be approved pipe with watertight joints.
- B 6.5 Where two (2) or more drain lines are installed, an approved distribution box of sufficient size to receive lateral lines shall be installed at the head of each disposal field. The inverts of all outlets shall be level and the invert of the inlet shall be at least 25.4 mm above the outlets. Distribution boxes shall be designed to insure equal flow and shall be installed on a level concrete slab in natural or compacted soil.
-
- Distribution boxes shall be coated on the inside with a bituminous coating or other approved method acceptable to the Administrative Authority.
- B 6.6 All laterals from a distribution box to the disposal field shall be approved pipe with watertight joints. Multiple disposal field laterals wherever practicable, shall be of uniform length.
- B 6.7 Connections between a septic tank and a distribution box shall be laid with approved pipe with watertight joints on natural ground or compacted fill.
- B 6.8 When the quantity of sewage exceeds the amount that can be disposed in 152.4 lineal meter of each line, a dosing tank shall be used. Dosing tanks shall be equipped with an automatic siphon or pump which discharges the tank once every three (3) or four (4) hours. The tank shall have a capacity equal to sixty (60) to seventy-five (75) percent of the interior capacity of the pipe to be dosed at one time. Where the total length of pipe exceeds 304.8 lineal meter the dosing tank shall be provided with two (2) siphons or pumps dosing alternately and each serving one-half (1/2) of the leach field.

B 6.9 Disposal fields shall be constructed as follows:

	Minimum	Maximum
Number of drain lines per field	1	-
Length of each line	-	30.5 mm
Bottom width of trench	457.2 mm	914.4 mm
Spacing of lines, center-to-center	1.8 mm	-
Depth of earth cover of lines [preferred (457.2 mm)]	304.8 mm	-
Grade of lines	level	25 mm/m
Filter material under drain lines	304.8 mm	-
Filter material over drain lines	50.8 mm	-

Minimum spacing between trenches or leaching beds shall be 1.2 m plus .6 m for each additional .3 m of depth in excess of .3 m below the bottom of the drain line. Distribution drain lines in leaching beds shall be more than 1.8 m apart on centers and no part of the perimeter of the leaching bed shall be more than .9 m from a distribution drain line. Disposal fields, trenches and leaching beds shall not be paved over or covered by concrete or any material that can reduce or inhibit any possible evaporation of sewer effluent.

B 6.10 When necessary on sloping ground to prevent excessive line slope, leach lines or leach beds shall be stepped. The lines between each horizontal section shall be made with watertight joints and shall be designed so each horizontal leaching trench or bed shall be utilized to the maximum capacity before the effluent shall pass to the next lower leach line or bed. The lines between each horizontal leaching section shall be made with approved watertight joints and installed on natural or unfilled ground.

B.7 Seepage Pits

B 7.1 The capacity of seepage pits shall be based on the quantity of liquid waste discharging thereinto, and on the character and porosity of the surrounding soil and shall conform to Section B-3 of this Appendix.

B 7.2 Multiple seepage pit installations shall be served through an approved distribution box or be connected in series by means of a water tight connection laid on undisturbed or compacted soil, the outlet from the pit shall have an approved vented leg fitting extending at least 304.8 mm below the inlet fitting.

B 7.3 Each seepage pit shall be circular in shape and shall have an excavated diameter of not less than 2.2 m. Each such pit shall be lined with approved type whole new hard burned clay brick, concrete brick, concrete circular type cesspool blocks, or other approved materials. Approval shall

be obtained prior to construction for any pit having an excavated diameter greater than 1.8 m.

- B 7.4 The lining in every seepage pit shall be laid on a firm foundation. Lining materials shall be placed tight together and laid with joints staggered. Except in the case of approved type pre-cast concrete circular sections, no brick or block shall be greater in height than its width and shall be laid flat to form at least a 101.6 mm wall. Brick or block greater than 304.8 mm in length shall have chamfered matching ends and be scored to provide for seepage. Excavation voids behind the brick, block, or concrete liner shall have a minimum of 152.4 mm of clean 19.1 mm gravel or rock.
- B 7.5 All brick or block used in seepage pit construction shall have a minimum compressive strength of 17225 kPa
- B 7.6 Each seepage pit shall have a minimum sidewall (not including the arch) of 3 m below the inlet.
- B 7.7 The arch or dome of any seepage pit may be constructed in one of three ways.
 - B 7.7.1 Approved type hard burned clay brick, or solid concrete brick, or block laid in cement mortar.
 - B 7.7.2 Approved brick or block laid dry.
 - In both of the above methods, an approved cement mortar covering of at least 50.8 mm in thickness shall be applied, said covering to extend at least 152.4 mm beyond the sidewalls of the pit
- B 7.7.3 Approved type one or two piece reinforced concrete slab of 17225 kPa minimum compressive strength, not less than 127 mm thick and designed to support an earth load of not less than 19.2 kPa. Each such cover shall be provided with a 228.6 mm minimum inspection hole with plug or cover and shall be coated on the underside with an approved bituminous or other non-permeable protective compound.
- B 7.8 The top of the arch or cover must be at least 457.2 mm but not more than 1.2 m below the surface of the ground.
- B 7.9 An approved vented inlet fitting shall be provided in every seepage pit so arranged as to prevent the inflow from damaging the sidewall

Exception: When using a one or two piece concrete slab cover inlet, fitting may be a one-fourth (1/4) bend fitting discharging through an opening in the top of the slab cover. On multiple seepage pit installations, the outlet fitting shall be per Section B7.2 of this Appendix.

B.8 Cesspools

- (a) A cesspool shall be considered only as a temporary expedient pending the construction of a public sewer, as an overflow facility when installed in conjunction with an existing cesspool, or as a means of sewage disposal for limited, minor, or temporary uses when first approved by the Administrative Authority.
- (b) Where it is established that a public sewer system will be available in less than two (2) years and soil and ground water conditions are favorable to cesspool disposal, cesspools without septic tanks may be installed for single family dwellings or for other limited uses when first approved by the Administrative Authority.
- (c) Each cesspool, when permitted, shall conform to the construction requirements set forth in Section B 7 of this Appendix for seepage pits and shall have a minimum sidewall (not including arch) of 6.1 m below the inlet provided, however, that when a strata of gravel or equally pervious material of 1.2 m in thickness is found, the depth of such sidewall need not be more than 3.1 m below the inlet
- (d) When overflow cesspools or seepage pits are added to existing installations, the effluent shall leave the existing pit through an approved vented leg extending at least 304.8 mm downward into such existing pit and having its outlet flow line at least 152.4 nm below the inlet. All pipe between pits shall be laid with approved watertight joints

B.9 Commercial or Industrial Special Liquid Waste Disposal

- B 9.1 When liquid wastes containing excessive amounts of grease, garbage, flammable wastes, sand, or other ingredients which may affect the operation of a private sewage disposal system, an interceptor for such wastes shall be installed.

- B 9.2 Installation of such interceptors shall comply with Section 1008 of this Code and their location shall be in accordance with Table B-1 of this Appendix.
- B 9.3 Sampling box shall be installed when required by the Administrative Authority.
- B 9.4 Interceptors shall be of approved design and be of not less than two (2) compartments. Structural requirements shall be in compliance with the applicable subparts of B 5 of this Appendix.
- B 9.5 Interceptors shall be located as close to the source as possible and be accessible for servicing. All necessary manholes for servicing shall be at grade level and be gastight.
- B 9.6 Waste discharge from interceptors may be connected to a septic tank or other primary system or be disposed into a separate disposal system.

RECOMMENDED DESIGN CRITERIA. (*formulae may be adapted to other types of occupancies with similar wastes.*)

		Grease and Garbage, Commercial Kitchens				Interceptor size (liquid capacity)				
Number of Meals per Peak hour	x	Waste flow rate	x	Retention time	x	Storage factor	=			
Sand-Silt Oil, Auto Washers										
Number of Vehicles per hour	x	Waste flow rate	x	Retention time	x	Storage factor	=	Interceptor size (liquid capacity)		
Silt-Lint Grease, Laundries, Laundromats										
Number of machines	x	2 cycles per hour	x	Waste flow rate	x	Retention time	x	Storage Factor	=	Interceptor size (liquid capacity)

Waste Flow Rate

See Table B-3 of this appendix for estimated flow rates.

Retention Times

Commercial kitchen waste:

Dishwasher and/or disposal 2.5 hours

Single service kitchen:

Single serving with disposal 1.5 hours

Sand-silt-oil 2.0 hours

Lint-silt (laundry) 2.0 hours

Storage Factors

Fully equipped commercial kitchen 8 hr. operation: 1;
16 hr. operation: 2;
24 hr. operation: 3

Single service kitchen 1.5

Auto washers self-serve: 1.5
employee operated: 2

Laundries, laundromats 1.5 (allows for rock filter)

B.10 Inspection and Testing

B 10.1 Inspection

- B 10.1.1 Applicable provision of Section 501 of this Code and this Appendix shall be complied with. Permits shall be required per Section 100 of this Code.
- B 10.1.2 System components shall be properly identified as to manufacturer. Septic tanks or other primary systems shall have the rated capacity permanently marked on the unit.
- B 10.1.3 Septic tanks or other primary systems shall be installed on dry, level, well-compacted soil.
- B 10.1.4 If design is predicated on soil tests, the system shall be installed at the same location and depth as the tested area.

B.10.2 Testing

- B 10.2.1 Septic tanks or other primary components shall be filled with water to flow line prior to requesting inspection. All seams or joints shall be left exposed (except the bottom) and the tank shall remain watertight.
- B 10.2.2 All flow test shall be performed through the system to the point of effluent disposal. All lines and components shall be watertight. Capacities, required air space, and fittings shall be in accordance with the provisions set forth in this Appendix.

B.11 Abandoned Sewers and Sewage Disposal Facilities

- B 11.1 Every abandoned building (house) sewer, or part thereof, shall be plugged or capped in an approved manner within 1.5 m of the property line.
- B 11.2 Every cesspool, septic tank, and seepage pit which has been abandoned or has been discontinued otherwise from further use or to which no waste or soil pipe from a plumbing fixture is connected, shall have the sewage removed therefrom and be completely filled with earth, sand, gravel, concrete, or other approved material.
- B 11.3 The top cover or arch over the cesspool, septic tank, or seepage pit shall be removed before filling and the filling

shall not extend above the top of the vertical portions of the sidewalls or above the level of any outlet pipe until inspection has been called and the cesspool, septic tank, or seepage pit has been inspected. After such inspection, the cesspool, septic tank, or seepage pit shall be filled to the level of the top of the ground.

- B 11.4 No person owning or controlling any cesspool, septic tank, or seepage pit, on the premises of such person or in that portion of any public street, alley, or other public property abutting such premises, shall fail, refuse, or neglect to comply with the provisions of this section or upon receipt of notice so to comply from the Department having jurisdiction.
- B 11.5 Where disposal facilities are abandoned consequent to connecting any premises with the public sewer, the permittee making the connection shall fill all abandoned facilities as required by the Administrative Authority within thirty (30) days from the time of connecting to the public sewer.

TABLE B-1
Location of Sewage Disposal System

Minimum Horizontal Distance In Clear Required From:	Building Sewer	Septic Tank	Disposal Field	Seepage Pit or Cesspool
1. Buildings or structures ¹	.6 m	1.5 m	2.4 m	2.4 m
2. Property line adjoining private property	Clear ²	1.5 m	1.5 m	2.4 m
3. Water supply wells	15.2 m ³	15.2 m	30.5 m	45.7 m
4. Streams	15.2 m	15.2 m	15.2 m	30.5 m
5. Trees	-	3 m	-	3 m
6. Seepage pits or cesspools	-	1.5 m	1.5 m	3.7 m
7. Disposal field	-	1.5 m	1.2 m	1.5 m
8. On site domestic water service line	.3 m ⁵	1.5 m	1.5 m	1.5 m
9. Distribution box	-		1.5 m	1.5 m
10. Pressure public water main	3 m ⁶	3 m	3 m	3 m

Note:
When disposal fields and/or seepage pits are installed in sloping ground, the minimum horizontal distance between any part of the leaching system and ground surface shall be 4.6 m.

1. Including porches and steps, whether covered or uncovered, breezeways, roofed porte-cocheres, roofed patios, carports, covered walks, covered driveways and similar structures or appurtenances.
2. See also Section 314 of this Code.
3. All drainage piping shall clear domestic water supply wells by at least 15.2 m. This distance may be reduced to not less than 7.6 m when the drainage piping is constructed of materials approved for use within a building.
4. Plus .6 m for each additional .3 m of depth in excess of .3 m below the bottom of the drain line. (See also Section B 6).
5. See Section 1208 of this Code.
6. For parallel construction – For crossings, approval by the Administrative Authority shall be required.
7. These minimum clear horizontal distances shall also apply between disposal field, seepage pits, and the ocean mean higher high tide line.

TABLE B-2
Capacity of Septic Tanks*

Single Family Dwellings – Number of Bedrooms	Multiple Dwelling Units or Apartments – One Bedroom Each	Other Uses: Maximum Drainage Fixture Units (DFU) Served per Table 7-2	Minimum Septic Tank Capacity in	
			Gallons	(liters)
1 or 2		15	750	(2838)
3		20	1000	(3785)
4	2 Units	25	1200	(4542)
5 or 6	3	33	1500	(5677.5)
	4	45	2000	(7570)
	5	55	2250	(8516.3)
	6	60	2500	(9462.5)
	7	70	2750	(10408.8)
	8	80	3000	(11355)
	9	90	3250	(12301.3)
	10	100	3500	(13247.5)
Extra bedroom, 567.8 liters each.				
Extra dwelling units over 10, 946.3 liters each.				
Extra fixture units over 100, 94.6 liters per fixture unit.				
<i>*Note:</i> Septic tank sizes in this table include sludge storage capacity and the connection disposal of domestic food waste units without further volume increase.				

TABLE B-3**Estimated Waste/Sewage Flow Rates**

Because of the many variables encountered, it is not possible to set absolute values for waste/sewage flow rates for all situations. The designer should evaluate each situation and, if figures in this table need modification, they should be made with the concurrence of the Administrative Authority.

Type of Occupancy	Liters Per Day
1. Airports	56.8 per employee 18.9 per passenger
2. Auto washers	Check with equipment manufacturer
3. Bowling alleys (snack bar only)	283.9 per lane
4. Camps:	
Campground with central comfort station	132.5 per person
With flush toilets, no showers	94.6 per person
Day camps (no meals served)	56.8 per person
Summer and seasonal	189.3 per person
5. Churches (Sanctuary)	18.9 per seat 26.5 per seat
6. Dance halls	18.9 per person
7. Factories	
No showers	94.6 per employee
With showers	132.5 per employee
Cafeteria, add	18.9 per employee
8. Hospitals	946.3 per bed 94.6 per bed 151.4 per bed
Kitchen waste only	
Laundry waste only	
9. Hotels (no kitchen waste)	227.1 per bed (2 person)

Continuation:

Type of Occupancy	Liters Per Day
10. Institutions (Residents,)	283.9 per person
Nursing home	473.1 per person
Rest home	473.1 per person
11. Laundries, self-service (minimum 10 hours per day)	189.3 per wash cycle
Commercial	Per manufacturer's specifications
12. Motel	189.3 per bed space
With kitchen	227.1 per bed space
13. Offices	75.7 per employee
14. Parks, mobile homes	946.3 per space
Picnic parks (toilets only)	75.7 per parking space
recreational vehicles --	
without hook-up	283.9 per space
with water and sewer hook-up	378.5 per space
15. Restaurants - cafeterias	75.7 per employee
Toilet	26.5 per customer
Kitchen waste	22.7 per meal
Add for garbage disposal	3.8 per meal
Add for cocktail lounge	7.6 per customer
Kitchen waste --	
Disposable service	7.6 per meal
16. Schools - Staff and office	75.7 per person
Elementary students	56.8 per person
Intermediate and high	75.7 per student
With gym and showers, add	18.9 per student
With cafeteria, add	11.4 per student
Boarding, total waste	378.5 per person
17. Service station, toilets	3785 for 1 st bay 1892.5 for each additional bay
18. Stores	75.7 per employee
Public restrooms, add	4 per sq. m. of floor space
19.	
20. Swimming pools, public	37.9 per person
Theaters, auditoriums	18.9 per seat
Drive-in	37.9 per space
(a) Recommended Design Criteria. Sewage disposal systems sized using the estimated waste/sewage flow rates should be calculated as follows:	
(1) Waste/sewage flow, up to 5677.5 L/day Flow x 1.5 = septic tank size.	
(2) Waste/sewage flow, over 5677.5 L/day Flow x 0.75 + 1125 = septic tank size	
(3) Secondary system shall be sized for total flow per 24 hours.	
(b) Also see Section B 2 of this Appendix.	

TABLE B-4
Design Criteria of Five Typical Soils

No.	Type of Soil	Required sq. m. of leaching area (m^2/L)	Maximum absorption capacity in (L/sq. m) of leaching area for a 24 hr. period (L/ m^2)
1.	Coarse sand or gravel	0.005	203.7
2.	Fine sand	0.006	162.9
3.	Sandy loam or sandy clay	0.010	101.9
4.	Clay with considerable sand or gravel	0.022	44.8
5.	Clay with small amount of sand or gravel	0.029	33.8

Table B-5

Required Sq. meter Leaching Area/Liter Septic Tank Capacity (m^2/L)	Maximum Septic Tank Size Allowable (Liters)
0.005-.006	28387.5
0.010	18925
0.022	13247.5
0.029	11355

USEFUL TABLES AND CHARTS

TABLE U-1

Asbestos Cement Pressure Pipe for Water Service and Yard Piping
Thrust at Fittings in Newtons at 689 kPa of Water Pressure

Pipe Size (mm)	Class*	Dead Ends and Tees	90° Bend	45° Bend	22 1/2° Bend
101.6	100	7654	10858	5874	2937
	150	8232.5	11614.5	6319	3204
	200	8232.5	11614.5	6319	3204
152.4	100	16910	23896.5	12949.5	6541.5
	150	16910	23896.5	12949.5	6541.5
	200	16910	23896.5	12949.5	6541.5
203.2	100	29281	41385	22428	11347.5
	150	29281	41385	22428	11347.5
	200	29281	41385	22428	11347.5
254	100	41741	59051.5	31995.5	16198
	150	47837.5	67640	36668	18556.5
	200	47837.5	67640	36668	18556.5
304.8	100	59318.5	83927	45568	23006.5
	150	68129.5	96298	52154	26433
	200	68129.5	96298	52154	26433
355.6	100	79788.5	103952	61143	30973
	150	92426.5	130652	70799.5	35867
	200	92426.5	130652	70799.5	35867
406.4	100	103284.5	146049	79566	40050
	150	119616	169144.5	91625.5	46413.5
	200	119616	169144.5	91625.5	46413.5
457.2	100	137950	196690	106132.5	53177.5
	150	153080	215825	117480	59630
	200	171770	242080	131942.5	66305
508	100	170880	241190	131275	65415
	150	189570	267000	145070	73425
	200	212710	299930	163315	82770
609.6	100	244750	347100	187790	93893
	150	273675	385815	210040	106355
	200	307050	432540	235405	119260

Example: For a pressure of 1033.5 kPa on a 101.6 mm tee, Table U-1 indicates 8232.5 N for 689 kPa. Therefore, total thrust for 1033.5 kPa will equal 1-1/2 times 8232.5 N.

TABLE U-2
PVC Cold Water
Building Supply and Yard Piping

THRUST AT FITTINGS IN PASCALS AT
689 kPa OF WATER PRESSURE

Mm	90° Bends	45° Bends	22-1/2° Bends	Dead Ends and Tees
38.1	1816.8	1001.3	511.8	1312.8
50.8	2870.3	1557.5	801	2024.8
63.5	4160.8	2269.5	1157	3937
76.2	6207.8	3359.8	1713.3	4383.3
88.9	7921	4280.9	2202.8	5607
101.6	10212.8	5540.3	2815.8	7209
127	15575	8455	4338.8	11080.5
152.4	22027.5	12059.5	6163.3	15797.5
203.2	36935	20025	10190.5	26077
254	56960	30705	15753	40272.5
304.8	80545	43610	22250	56960

Example :

For a pressure of 1033.5 kPa on a 101.6 mm tee, Table U-2 (a) indicates 7209 N for 689 kPa. Therefore, total thrust for 1033.5 kPa will equal 1-1/2 times 7209 N for a total thrust of 10810 N. To determine the bearing area of thrust blocks, refer to Table U-3 for the safe bearing load of the soil and divide the total thrust by this safe bearing load.

TABLE U-3
Safe Bearing Loads of Various Soils

Item No.	Soil	Safe Bearing Load (kPa)
1	Mulch, Peat, etc.	0
2	Soft Clay	6890
3	Sand	13780
4	Sand and Gravel	20670
5	Sand and Gravel Cement with Clay	27360
6	Hard Shale	68900

Example: Assume a 17800 N total thrust was computed. The soil condition is sand. The required bearing area of the thrust block is 17800 N divided by 13780 kPa or .19 m².

CHART U-1

LOCATION OF THRUST BLOCKS
(Standard and metric combined)
A Comparison of Thrust-Block Areas

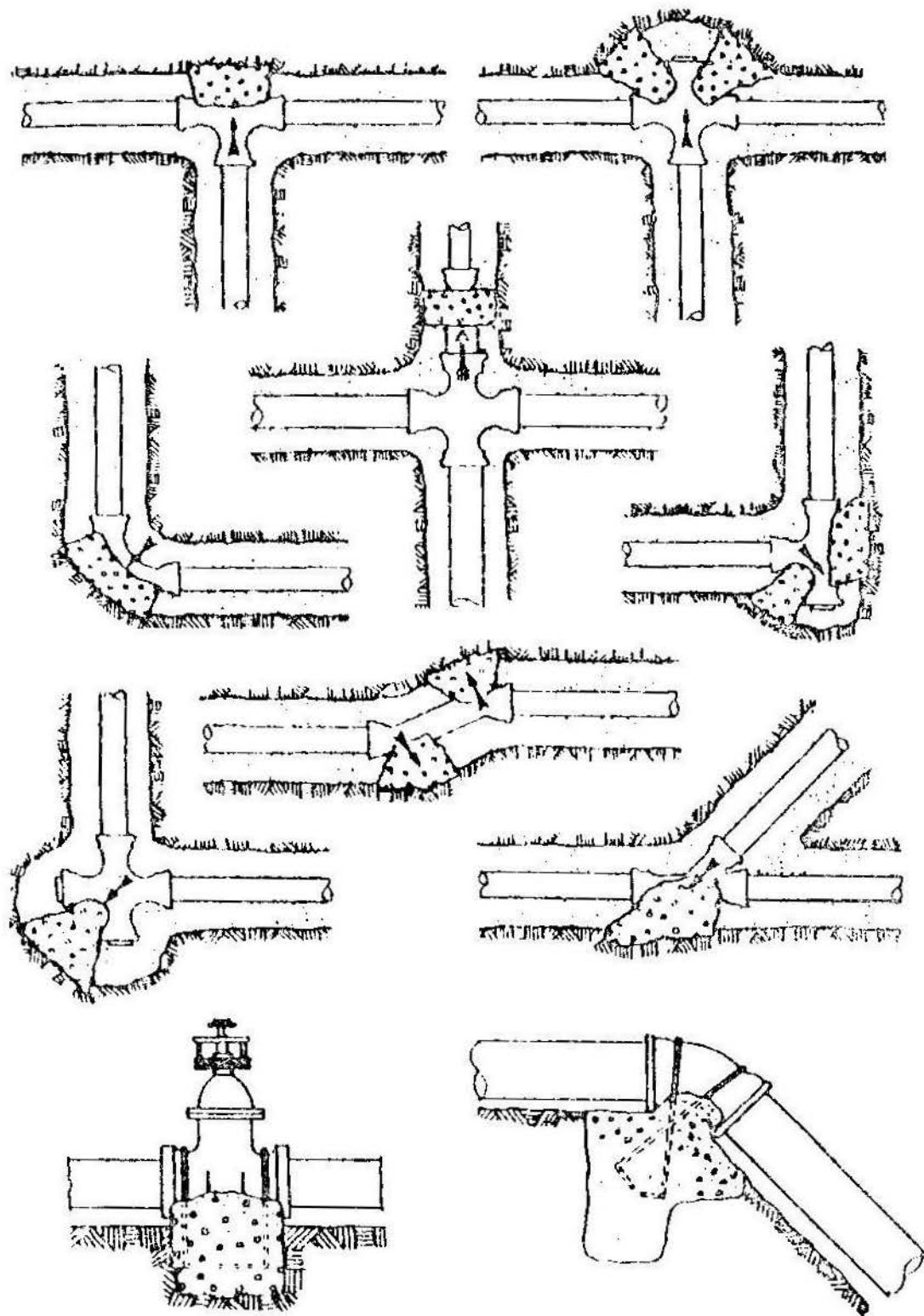
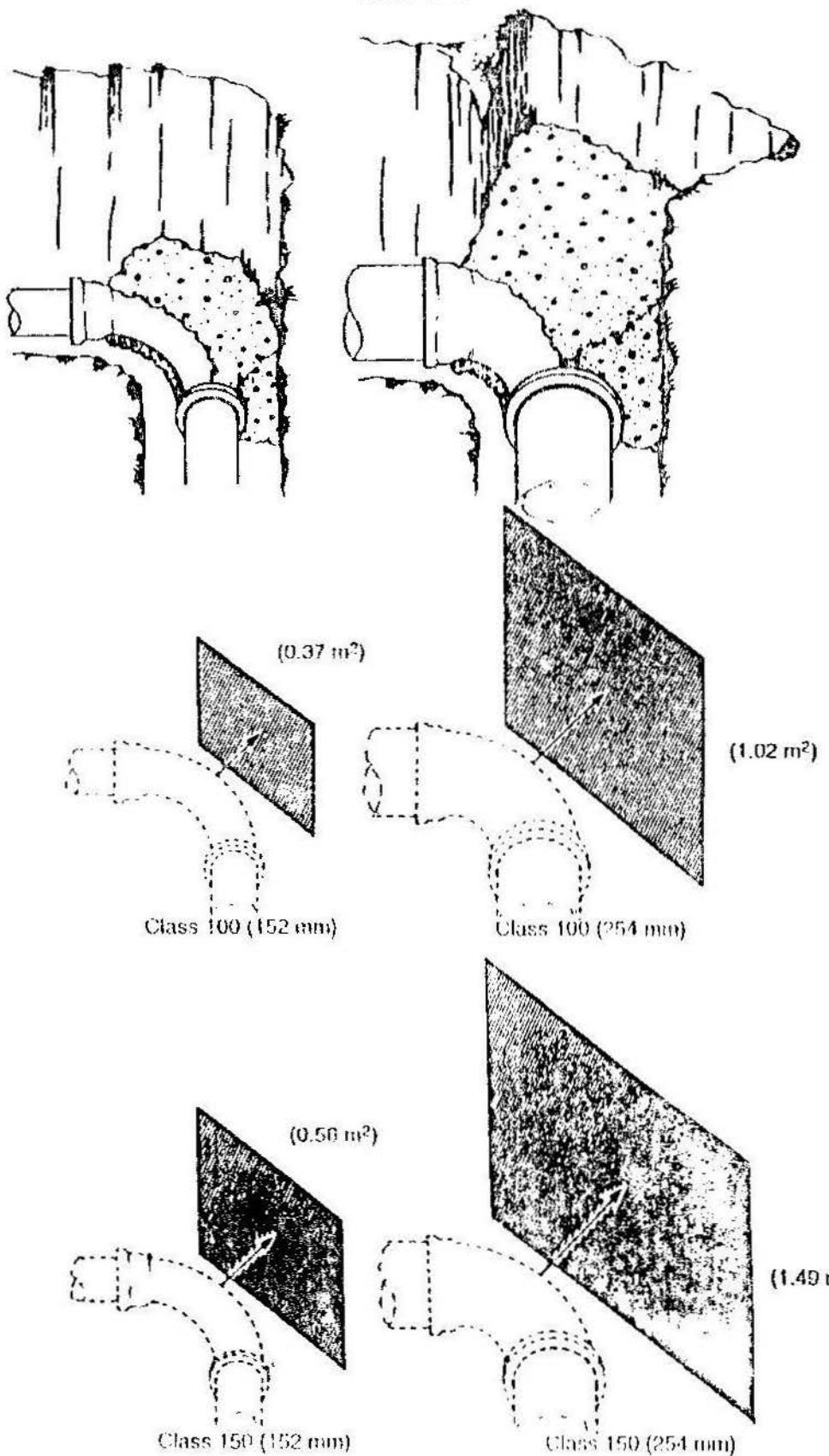


CHART U-2



CPVC Solvent Cemented Hot and Cold Water Distribution Systems Thermal Expansion

General. Allowance for thermal expansion and contraction shall be provided by approved means. Allowance shall be based on an expansion rate of (100 mm) per (30 m) of length of run per (55°C) temperature change.

Note: Expansion rate is independent of the size of the pipe.

Offsets and Loops. Thermal expansion may be provided for by use of expansion loops, offsets, or changes of direction. From Table U-4 determine the length "L" that is required. Note that "L" is based on length of run, diameter of pipe, and maximum temperature of water.

Clearance. Adequate clearance shall be provided between piping and structure (such as bored holes and sleeves) to allow for free longitudinal movement.

TABLE U-4
Developed Length "L" of Expansion Loops

Nominal Size (mm)	Length of Run in Meters				
	6.09	12.20	18.29	24.39	30.49
Loop Length "L" in mm					
12.7	558.8	787.4	965.2	1117.6	1270
19.1	660.4	939.8	1168.4	1320.8	1473.2
25.4	762	1066.8	1305.2	1524	1701.8
32	838.2	1193.8	1447.8	1676.4	1879.6
38	914.4	1295.4	1574.8	1828.8	2032
51	1041.4	1473.2	1803.4	2082.8	2311.4

Example: Pipe Size 19.1 Length of Run 18.29 m from Table U-4

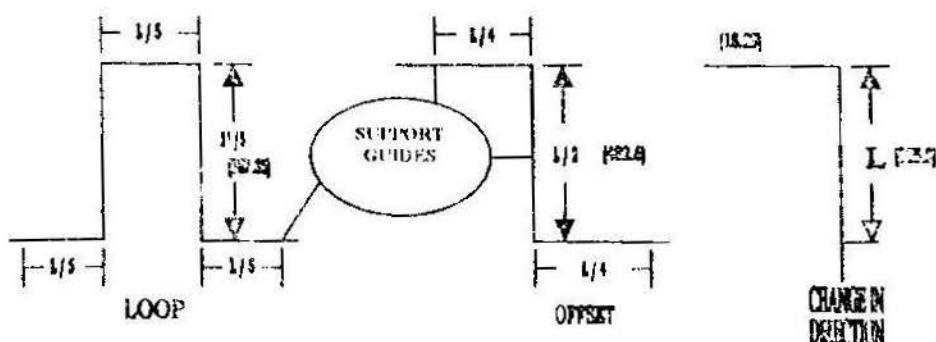


TABLE U-5
PVC-DWV TYPE I
THERMAL EXPANSION TABLE
 Chart Shows Length Change in Millimeters
 vs. Degrees Temperature Change
 $\frac{0.2 \text{ mm}}{\text{mm } ^\circ\text{C}}$
 Coefficient of Linear Expansion: mm $^\circ\text{C}$

Length (mm)	4°C	10°C	16°C	21°C	27°C	32°C	38°C
6096	7.1	8.8	10.6	12.4	14.2	15.9	17.7
12192	14.2	17.7	21.2	24.7	28.3	31.4	35.4
18288	21.2	26.5	31.8	37.1	42.4	47.7	53.0
24384	28.8	35.4	42.4	49.5	56.6	63.7	70.7
30480	35.4	44.2	53.0	61.9	70.7	79.6	88.4

Example:

Highest temperature expected	100°F (38°C)
Lowest temperature expected	<u>-50°F (-10°C)</u>
	50°F (10°C)

Length of run = 18288 mm from chart, read 26.5 mm linear expansion that must be provided for.

TABLE U-6**Maximum Working Pressure of Plastic Tubes**

Pipe	Schedule	Fittings Sizes	Maximum Working Pressure
160 psi (SDR 26)* (1102.4 kPa)	40	12.7 mm – 203 mm	1102.4 kPa
	80	12.7 mm – 203 mm	1102.4 kPa
200 psi (SDR 21) (1378 kPa)	40	12.7 mm – 102 mm	1378 kPa
	80	12.7 mm – 203 mm	1378 kPa
250 psi (SDR 17) (1722.5 kPa)	40	12.7 mm – 76 mm	1722.5 kPa
	80	12.7 mm – 203 mm	1722.5 kPa
315 psi (SDR 13.5) (2170.4 kPa)	40	12.7 mm – 38 mm	2170.4 kPa
	80	12.7 mm – 102 mm	2170.4 kPa
Schedule 40	40	12.7 mm – 38 mm	2204.8 kPa
	40	51 mm – 102 mm	1515.8 kPa
	40	127 mm – 203 mm	1102.4 kPa
Schedule 80	40	12.7 mm – 38 mm	2204.8 kPa
	40	51 mm – 102 mm	1515.8 kPa
	40	127 mm – 203 mm	1102.4 kPa
	80	12.7 mm – 102 mm	2204.8 kPa
	80	127 mm – 203 mm	1722.5 kPa

* SDR 26 - pressure classification of Plastic Tubes which mean "Standard Dimension Ratio" outside diameter divided by the thickness.

TABLE U-7
BENDING GUIDE FOR COPPER TUBE

Tube Size, Inches (mm)	Tube Type	Temper	Minimum Bend Radius, Inches (mm)	Type of Bending Equipment
1/4 (6.4)	K,L	Annealed	3/4 (19.1)	Lever type
3/8 (9.5)	K,L	Annealed	1-1/2 (38) 3 (76)	Lever or gear type None, by hand*
	K,L,M	Drawn	1-3/4 (44)	Gear type
1/2 (12.7)	K,L	Annealed	2-1/4 (57) 4-1/2 (114)	Lever or gear type None, by hand*
	K,L,M	Drawn	2-1/2 (64)	Gear type
3/4 (19.1)	K,L	Annealed	3 (76)	Lever or gear type
	K		4-1/2 (114)	None; by hand*
	L		6 (152)	None; by hand*
	K	Drawn	3 (76)	Gear type
	K,L		4 (102)	Heavy-duty gear type
1 (25.4)	K,L	Annealed	4 (102) 7-1/2 (191)	Gear type None; by hand*
1-1/4 (32)	K,L	Annealed	9 (229)	None; by hand*

* When bending by hand, without the use of bending equipment, a circular wooden disc is used. The radius of the disc should be about 6.4 mm to 12.7 mm less than the minimum bend radius shown.

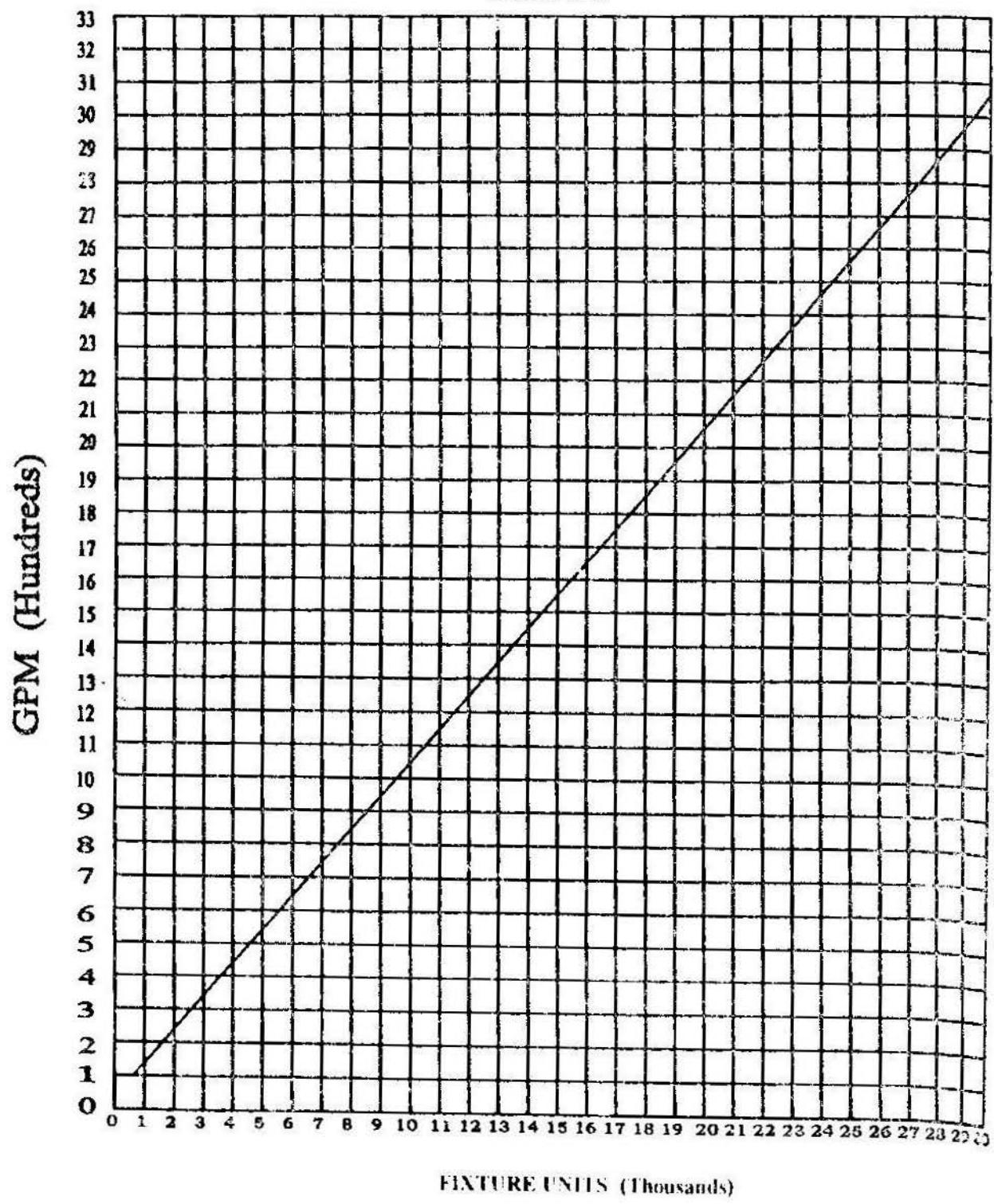
SAMPLE AIR TEST TABLE U-8
 Minimum time, in seconds, for pressure to drop from
 3-1/2 (24 kPa) to 2-1/2 (17 kPa) PSIG

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Length of Line		3-4 in. 76.2 – 101.6 mm	6 in. 152.4 mm	8 in. 203.2 mm	10 in. 254 mm	12 in. 304.8 mm
(feet)	(m)					
25	7.6	30	30	30	30	30
50	15.2	30	30	35	55	79
75	22.9	30	30	53	83	119
100	30.5	30	40	70	110	158
125	38.1	30	50	88	138	198
150	45.7	30	59	106	165	238
175	53.3	31	69	123	193	277
200	61	35	79	141	220	317
225	68.6	40	89	158	248	340
250	76.2	44	99	176	275	340
275	83.8	48	109	194	283	340
300	91.4	53	119	211	283	340
325	99.1	57	129	227	283	340
350	106.7	62	139	227	283	340
375	114.3	66	148	227	283	340
400	121.9	70	158	227	283	362
450	137.2	79	170	227	283	407
500	152.4	83	170	227	314	452

COLD WATER SYSTEMS
Conversion of Fixture Units to GPM

CHART U-3



Fixture Units (Thousands)

DESIGN LOAD VERSUS FIXTURE UNITS, MIXED SYSTEM

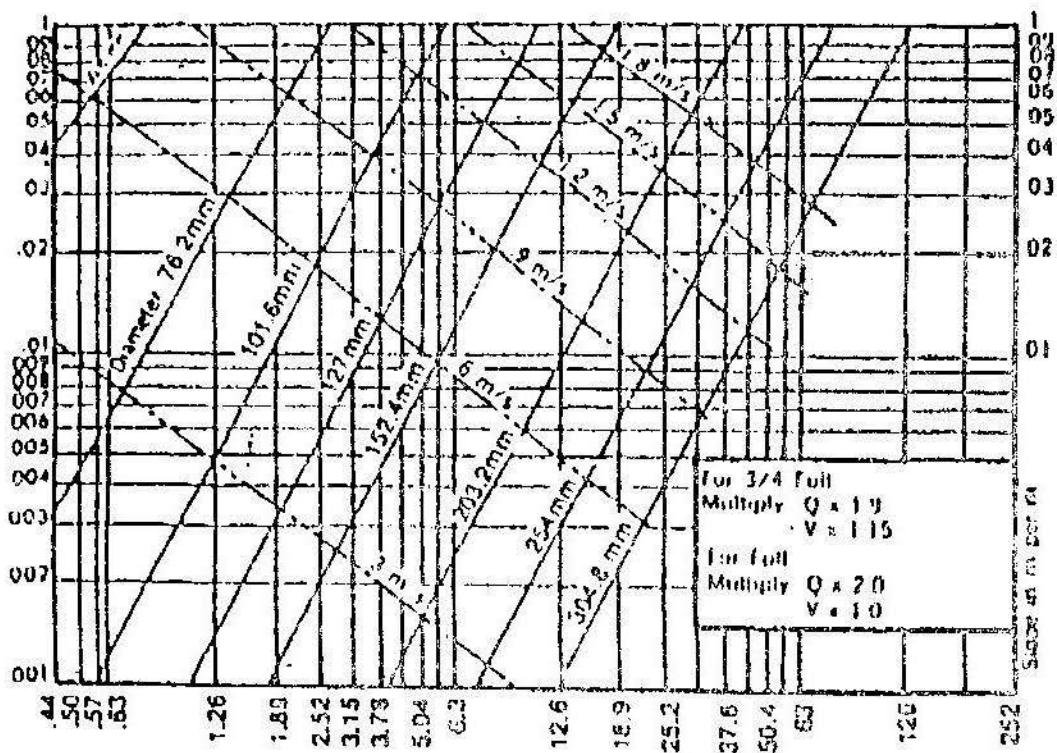
FLOW IN PARTLY FILLED PIPES**CHART U-4**

TABLE U-9
Conversion Table

NO.	MULTIPLY	BY	TO OBTAIN
1.	Acres	43,560	Square feet
2.	Acre-feet	43,560	Cubic feet
3.	Acre-feet	325,851	U.S. Gallons
4.	Atmospheres	76.0	Cms of mercury
5.	Atmospheres	29.92	Inches of mercury
6.	Atmospheres	33.90	Feet of water
7.	Atmospheres	14.70	Pounds/square inch
8.	Btu/minute	12.96	Foot-Pounds/second
9.	Btu/minute	0.02356	Horse-power
10.	Centimeters	0.3937	Inches
11.	Centimeters of mercury	0.01316	Atmospheres
12.	Centimeters of mercury	0.4461	Feet of water
13.	Centimeters of mercury	27.85	Pounds/square feet
14.	Centimeters of mercury	0.1934	Pounds/square inch
15.	Cubic feet	1728	Cubic inches
16.	Cubic feet	0.03704	Cubic yards
17.	Cubic feet	7.48052	U.S. Gallons
18.	Cubic feet	29.92	Quarts (liquid)
19.	Cubic feet/minute	472.0	Cubic cms/second
20.	Cubic feet/minute	0.1247	Gallons/second
21.	Cubic feet/minute	62.43	Pounds of water/minute
22.	Cubic feet/second	0.0646317	Million gallons/day
23.	Cubic feet/second	448.831	Gallons/minute
24.	Cubic yards	27	Cubic feet
25.	Cubic yards	202.0	U.S. Gallons
26.	Feet of water	0.02950	Atmosphere
27.	Feet of water	0.8826	Inches of mercury
28.	Feet of water	62.43	Pounds/square feet
29.	Feet of water	0.4335	Pounds/square inch
30.	Feet/minute	0.01667	Feet/second
31.	Feet/minute	0.01136	Miles/hour
32.	Feet/second	0.6818	Miles/hour
33.	Feet/second	0.01136	Miles/minute
34.	Gallons U.S.	3785	Cubic centimeters
35.	Gallons U.S.	0.1337	Cubic feet
36.	Gallons U.S.	231	Cubic inches
37.	Gallons U.S.	4	Quarts (liquid)
38.	Gallons water U.S.	8.3453	Pounds of water
39.	Gallons/minute U.S.	0.002228	Cubic feet/second
40.	Gallons/minute	8.0208	Cubic feet/hour

TABLE U-9 (Continued)

NO.	MULTIPLY	BY	TO OBTAIN
41.	Gallons water/minute	6.0086 ..	Cubic feet/hour
42.	Inches	2.540 ..	Tons of water/24 hours
43.	Inches of mercury	0.03342 ..	Centimeters
44.	Inches of mercury	1.133 ..	Atmospheres
45.	Inches of mercury	0.4912 ..	Pounds/square inch
46.	Inches of water	0.002458 ..	Atmospheres
47.	Inches of water	0.07355 ..	Inches of mercury
48.	Inches of water	5.202 ..	Pounds/square feet
49.	Inches of water	0.03613 ..	Pounds/square inch
50.	Liters	1000 ..	Cubic centimeters
51.	Liters	61.02 ..	Cubic inches
52.	Liters	0.2642 ..	Gallons
53.	Miles	5280 ..	Feet
54.	Miles/hour	88 ..	Feet/minute
55.	Miles/hour	1 467 ..	Feet/second
56.	Millimeters	0.1 ..	Centimeters
57.	Millimeters	0.03937 ..	Inches
58.	Million gallon/day	1.54723 ..	Cubic feet/second
59.	Pounds of water	0.01602 ..	Cubic feet
60.	Pounds of water	27.68 ..	Cubic inches
61.	Pounds of water	0.1198 ..	Gallons
62.	Pounds/cubic inch	1728 ..	Pounds/cubic feet
63.	Pounds/square foot	0.01602 ..	Feet of water
64.	Pounds/square inch	0.06804 ..	Atmospheres
65.	Pounds/square inch	2.307 ..	Feet of water
66.	Pounds/square inch	2.036 ..	Inches of mercury
67.	Quarts (dry)	67.20 ..	Cubic inches
68.	Quarts (liquid)	57.75 ..	Cubic inches
69.	Square feet	144 ..	Square inches
70.	Square miles	640 ..	Acres
71.	Square yards	9 ..	Square feet
72.	Temperature ($^{\circ}\text{C}$) + 273	1 ..	Abs. Temperature ($^{\circ}\text{C}$)
73.	Temperature ($^{\circ}\text{C}$) + 17.28	1.8 ..	Temperature ($^{\circ}\text{F}$)
74.	Temperature ($^{\circ}\text{F}$) + 460	1 ..	Abs. Temperature ($^{\circ}\text{F}$)
75.	Temperature ($^{\circ}\text{F}$) - 32	5/9 ..	Temperature ($^{\circ}\text{C}$)
76.	Tons (short)	2000 ..	Pounds
77.	Tons of water/24 hours	83.333 ..	Pounds water/hour
78.	Tons of water/24 hours	0.16643 ..	Gallons/minute
79.	Tons of water/24 hours	1.3349 ..	Cubic feet/hour

TABLE U-10
METRIC SYSTEMS
(INTERNATIONAL SYSTEM OF UNITS - SI)

NO.	TO CONVERT	INTO	MULTIPLY BY
1.	Atmospheres	Cms of mercury	76.0
2.	Btu	Joules	1,054.8
3.	Btu/hour	Watts	0.2931
4.	Btu/minute	Kilowatts	0.01757
5.	Btu/minute	Watts	17.57
6.	Centigrade	Fahrenheit	$(^{\circ}\text{C} \times 9/5) + 32^{\circ}$
7.	Circumference	Radians	6.283
8.	Cubic centimeters	Cubic inches	0.06102
9.	Cubic feet	Cubic meters	0.02832
10.	Cubic feet	Liters	28.32
11.	Cubic feet/minute	Cubic cms/second	472.0
12.	Cubic inches	Cubic cms	16.39
13.	Cubic inches	Liters	0.01639
14.	Cubic meters	Gallons (U.S. liquid)	264.2
15.	Feet	Centimeters	30.48
16.	Feet	Meters	0.3048
17.	Feet	Millimeters	304.8
18.	Feet of water	Kgs/square cm	0.03048
19.	Foot-Pounds	Joules	1.356
20.	Foot-pounds/minute	Kilowatts	2.260×10^{-5}
21.	Foot-pounds/second	Kilowatts	1.356×10^{-3}
22.	Gallons (U.S.)	Liters	3.785
23.	Horsepower	Watts	745.7
24.	Horsepower-hours	Joules	2.684×10^6
25.	Horsepower-hours	Kilowatts	0.7457
26.	Joules	Btu	9.480×10^{-4}
27.	Joules	Foot-pounds	0.7376
28.	Joules	Watt-hours	2.778×10^{-4}
29.	Kilograms	Pounds	2.205
30.	Kilograms	Tons (short)	1.102×10^{-3}
31.	Kilometers	Miles	0.6214
32.	Kilometers/hour	Miles/hour	0.6214
33.	Kilowatts	Horsepower	1.341
34.	Kilowatt-hours	Btu	3,413
35.	Kilowatt-hours	Foot-pounds	2.655×10^6
36.	Kilowatt-hours	Joules	3.6×10^6
37.	Liters	Cubic feet	0.03531
38.	Liters Meters	Gallons (U.S. liquid)	0.2642
39.	Meters	Feet	3.281
40.	Meters	Inches	39.37

TABLE U-10 (*Continued*)

TABLE U-10
METRIC SYSTEMS
(INTERNATIONAL SYSTEM OF UNITS - SI)

NO.	TO CONVERT	INTO	MULTIPLY BY
41.	Meters	Yards	1.094
42.	Meters/second	Feet/second	3.281
43.	Meters/second	Miles/hr	2.237
44.	Miles (statute)	Kilometers	1.608
45.	Miles/hour	Meters/minutes	26.82
46.	Millimeters	Inches	0.03937
47.	Ounces (fluid)	Liters	0.02957
48.	Pints (liquid)	Cubic centimeters	473.2
49.	Pounds	Kilograms	0.4536
50.	PSI	Pascals	6,895
51.	Quarts (liquid)	Liters	0.9463
52.	Radians	Degrees	57.30
53.	Square inches	Square millimeters	645.2
54.	Square meters	Square inches	1,550
55.	Square millimeters	Square inches	1.550 x 10 ⁻³
56.	Watts	Btu/hour	3.4129
57.	Watts	Btu/minute	0.05688
58.	Watts	Foot-pounds/second	0.7378
59.	Watts	Horsepower	1.341 x 10 ⁻³

TABLE U-11
AREAS AND CIRCUMFERENCE OF CIRCLES

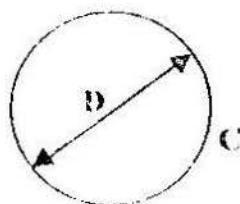
Diameter		Circumference		Area	
Inches	mm	Inches	mm	Inches ²	mm ²
1/8	3.2	0.40	10	0.01227	8.0
1/4	6.4	0.79	20	0.04909	31.7
3/8	9.5	1.18	30	0.11045	71.3
1/2	12.7	1.57	40	0.19635	126.7
3/4	19.1	2.36	60	0.44179	285.0
1	25.4	3.14	80	0.7854	506.7
1-1/4	31.8	3.93	100	1.2272	791.7
1-1/2	38.1	4.71	120	1.7671	1140.1
2	50.8	6.28	160	3.1416	2026.8
2-1/2	63.5	7.85	200	4.9087	3166.9
3	76.2	9.43	240	7.0686	4560.4
4	101.6	12.55	320	12.566	8107.1
5	127.0	15.71	400	19.635	12,667.7
6	152.4	18.85	480	28.274	18,241.3
7	177.8	21.99	560	38.485	24,828.9
8	203.2	25.13	640	50.265	32,428.9
9	228.6	28.27	720	63.617	41,043.1
10	254.0	31.42	800	78.540	50,670.9

CHART U-5

EQUAL PERIPHERIES

$$S \approx 0.7854 D$$

$$D \approx 1.2732 S$$



$$S \approx 0.8862 D$$

$$D \approx 1.1284 S$$

$$S \approx 0.2821 C$$

EQUAL AREAS

$$\text{Area of square } (S^2) = \\ 1.2732 \times \text{area of circle}$$

$$\text{Area of square } (S) = \\ 0.6366 \times \text{area of circle}$$

$$C = \pi D = 2\pi R$$

$$C = 3.5446 \sqrt{\text{area}}$$

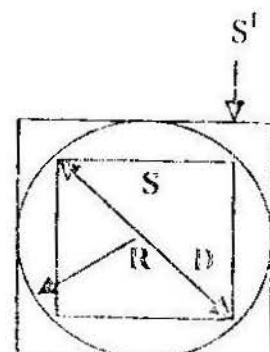
$$D = 0.3183 C = 2R$$

$$D = 1.1283 \sqrt{\text{area}}$$

$$\text{Area} = \pi R^2 = 0.7854 D^2$$

$$\text{Area} = 0.07958 C^2 = \underline{\pi D^2}$$

4



$$\pi = 3.1416$$

TABLE U-12
PERTINENT LAWS, RULES & REGULATIONS AFFECTING PLUMBING WORKS

	P.D.	Year
I. Department of Health		
1. The Code on Sanitation of the Philippines with Implementing Rules & Regulations	P.D No. 856	1976
2. Manual on Hospital Waste Management		1993
3. Philippines National Standards for Drinking Water		1993
II. Malacañang Palace		
Implementing Sanitation Requirements, Rules & Regulations for the Protection and Convenience of the Travelling Public	P.D No. 522	1974
III. National Water Resources Council		
Philippine Water Code & the Implementing Rules & Regulations		1979
IV. Department of Environment and Natural Resources (DENR)		
Environment Management Bureau (EMB Absorbed Functions of National Pollution Control Commission)		
1. Rules and Regulation of NPCC, As Amended		1978
2. DENR Administrative Order 34 Revised Water Usage and Classification		Mar. 20, 1990
3. DENR Administrative Order 35 Revised Efficient Regulations of 1990		Mar. 20, 1990
V. Housing and Land Use Regulatory Board		
Amended Rules and Standards for Economic and Socialized Housing Projects to Implement "BATAS PAMBANSA BLG. 220"		
(Exceptions from Provisions of PD's 957, 1216 & 1185)		Mar. 25, 1982
VI. PD No. 1594 and Its Implementing Rules and Regulations as Revised (Licensing and Accreditation of Philippine Contractors) Construction Industry of the Philippines		
VII. National Building Code of the Philippines and Implementing Rules and Regulations (DPWH)	P.D No. 1096	
VIII. National Plumbing Code of the Philippines, As Amended		
IX. Sanitary Engineering Code of the Philippines		
X. Applicable Provisions of Charter: MWSS, LWUA, DILG, N.H.C		
XI. The Fire Code of the Philippines & Regulations	P.D No. 1185	
XII. Board of Master Plumbing Regulations		
XIII. Creation of Professional Regulation Commission	P.D No. 223	
XIV. Plumbing Law	R.A No. 1378	
XV. Protection of Professionals in the Philippines	L.O.I 1000	

TABLE U - 13
LIST OF PLUMBING MATERIALS FOR SPECIFIC USES

	Abbrev.	Color Coding	Reference Materials Used in Plumbing
I. For Potable Water Supply System			
1. Aluminum Pipes (For Distilled Water Line)	AlP		✓
2. Copper Pipes and Tubes	CuP		✓
3. Steel or Wrought Iron Pipes with Lining Coating	SLP		✓
4. Stainless Steel Pipe	SSP		✓
5. Centrifugally Cast Iron Pipes with Cement Mortar Lining	CCIP		✓
6. Centrifugally Cast Ductile Pipes with Cement Mortar Lining	DCIP		✓
7. Plastic Tubes with NEOPRENE Gaskets			
(1) Polyvinyl Chloride Tube	PVCT	Blue	✓
(2) Polybutylene Tube	Pbt	Black	✓
(3) Polyethylene Tube	PeT	Black	✓
(4) Polypropylene Tube	PT	White w/ Blue Band	✓
(5) Polythene Tube	PT	- do -	✓
(6) Composite Aluminum & Pe Lining & Coating	Al & PeT	Blue	✓
8. Reinforced Concrete Pressure Pipes	RCPP		✓
9. Glass-Lined Metallic Pipes			✓
10. R. C (Open) Flumes, Tunnel Lining and Aqueducts			✓
11. Fiberglass Pipes			✓
II. For Sanitary Drainage System			
1. Steel Pipe with Cement Mortar Lining and Conc. Encasement			✓
2. Cast Iron Soil Pipe with H & S or Plain Ends with SS Clamp & Neoprene Gasket			✓
3. Plastic Tubes with Neoprene Gaskets			
(1) Polyvinyl Chloride Tube	PVCT	Orange & Gray	✓
(2) Recycled Scrap Plastic	ReP	Black	✓
4. Asbestos Cement Pipe	ACP		✓
5. Concrete Drain Pipe with Calcareous Aggregates	CDP		✓
6. Vitrified Clay Pressure Pipe, Hub & Spigot Ends	VCP		✓
7. Red Clay Brick Masonry for Flumes and Culverts			✓
8. Fiberglass Pipes			✓
III. For Storm Drainage System			
1. Reinforced Concrete and Plain Concrete Culverts and Pipes	RCC		✓
2. Steel Cylinder with R.C Lining and Encasement			✓
3. Cast-in-Site R.C Culverts			✓
4. Red Clay Brick Masonry Culverts and Flumes			✓
5. Corrugated Galvanized Steel Culvert with Concrete Invert Lining and without or without R.C Encasement			✓
6. Asbestos Cement Drain Pipe			✓
7. Recycled Scrap Plastic Tubular Products			✓
8. Fiberglass Pipes			✓

LEGEND:

(✓) APPLICABLE

The National Plumbing Code Coordinating Agencies

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